

VPDES PERMIT PROGRAM FACT SHEET

This document gives pertinent information concerning the VPDES Permit listed below. This permit is being processed as a MAJOR, MUNICIPAL permit.

1. PERMIT NO.: VA0081311 EXPIRATION DATE: 1/27/2018
2. FACILITY NAME AND LOCAL MAILING ADDRESS FACILITY LOCATION ADDRESS (IF DIFFERENT)

Hampton Roads Sanitation District
York River STP
1436 Air Rail Ave
Virginia Beach, VA 23455

515 Back Creek Road
Seaford, VA 23696

CONTACT AT FACILITY:

NAME: Jamie Heisig-Mitchell
TITLE: Chief of Technical Services
PHONE: (757) 460-4220

CONTACT AT LOCATION ADDRESS

NAME: N/A
TITLE:
PHONE:

3. OWNER CONTACT: (TO RECEIVE PERMIT) CONSULTANT CONTACT:
NAME: Mr. Edward G. Henifin NAME: N/A
TITLE: General Manager FIRM NAME:
COMPANY NAME: HRSD ADDRESS:
ADDRESS: 1436 Air Rail Ave
Virginia Beach, VA 23455
PHONE: (757) 460-2261 PHONE: ()

4. PERMIT DRAFTED BY: DEQ, Water Permits, Regional Office

Permit Writer(s): Deanna Austin *DDA* Date(s): 5/2015-2/2016
Reviewed By: Carl Thomas *CT* Date(s): 3/14/16.

5. PERMIT ACTION:

() Issuance () Reissuance (X) Revoke & Reissue () Owner Modification
() Board Modification () Change of Ownership/Name [Effective Date:]

6. SUMMARY OF SPECIFIC ATTACHMENTS LABELED AS:

Attachment <u>1</u>	Site Inspection Report/Memorandum
Attachment <u>2</u>	Discharge Location/Topographic Map
Attachment <u>3</u>	Schematic/Plans & Specs/Site Map/Water Balance
Attachment <u>4</u>	TABLE I - Discharge/Outfall Description
Attachment <u>5</u>	TABLE II - Effluent Monitoring/Limitations
Attachment <u>6</u>	Effluent Limitations/Monitoring Rationale/Suitable Data/Antidegradation/Antibacksliding
Attachment <u>7</u>	Special Conditions Rationale
Attachment <u>8</u>	Toxics Monitoring/Toxics Reduction/WET Limit Rationale
Attachment <u> </u>	Material Stored
Attachment <u>9</u>	Receiving Waters Info./Tier Determination/STORET Data/Stream Modeling
Attachment <u>9</u>	303(d) Listed Segments
Attachment <u>10</u>	TABLE III(a) and TABLE III(b) - Change Sheets
Attachment <u> </u>	NPDES Industrial Permit Rating Worksheet and EPA Permit Checklist
Attachment <u>11</u>	Chronology Sheet
Attachment <u> </u>	Public Participation

APPLICATION COMPLETE: 12/8/15-Mix Approval Date

PERMIT CHARACTERIZATION: (Check as many as appropriate)

- | | |
|--|--|
| <input checked="" type="checkbox"/> Existing Discharge | <input checked="" type="checkbox"/> Effluent Limited |
| <input type="checkbox"/> Proposed Discharge | <input checked="" type="checkbox"/> Water Quality Limited |
| <input checked="" type="checkbox"/> Municipal | <input type="checkbox"/> WET Limit |
| <u>SIC Code #4952</u> | <input type="checkbox"/> Interim Limits in Permit |
| <input type="checkbox"/> Industrial | <input type="checkbox"/> Interim Limits in Other Document |
| SIC Code(s) | <input type="checkbox"/> Compliance Schedule Required |
| <input checked="" type="checkbox"/> POTW | <input type="checkbox"/> Site Specific WQ Criteria |
| <input type="checkbox"/> PVOTW | <input type="checkbox"/> Variance to WQ Standards |
| <input type="checkbox"/> Private | <input type="checkbox"/> Water Effects Ratio |
| <input type="checkbox"/> Federal | <input checked="" type="checkbox"/> Discharge to 303(d) Listed Segment |
| <input type="checkbox"/> State | <input type="checkbox"/> Toxics Management Program Required |
| <input type="checkbox"/> Publicly-Owned Industrial | <input type="checkbox"/> Toxics Reduction Evaluation |
| | <input type="checkbox"/> Storm Water Management Plan |
| | <input checked="" type="checkbox"/> Pretreatment Program Required |
| | <input type="checkbox"/> Possible Interstate Effect |
| | <input checked="" type="checkbox"/> CBP Significant Dischargers List |

8. **RECEIVING WATERS CLASSIFICATION:** River basin information.

Outfall No: 001

Receiving Stream: York River
River Mile: 8-YRK002.76/3.37
Basin: York River
Subbasin: N/A
Section: 1
Class: II
Special Standard(s): a
Tidal: YES
7-Day/10-Year Low Flow: N/A
1-Day/10-Year Low Flow: N/A
30-Day/5-Year Low Flow: N/A
Harmonic Mean Flow: N/A

Outfall No(s): 002, 003, 005-007

Receiving Stream: Back Creek
River Mile: 7-BRC001.79
Basin: Chesapeake Bay, Atlantic Ocean and Small Coastal Basins
Subbasin: N/A
Section: 2
Class: II
Special Standard(s): a
Tidal: YES
7-Day/10-Year Low Flow: N/A
1-Day/10-Year Low Flow: N/A
30-Day/5-Year Low Flow: N/A
Harmonic Mean Flow: N/A

9. **FACILITY DESCRIPTION:** Describe the type facility from which the discharges originate.

Existing municipal discharge resulting from the discharge of treated domestic sewage.

10. **LICENSED OPERATOR REQUIREMENTS:** () No (X) Yes Class: I

11. **RELIABILITY CLASS:** I

12. SITE INSPECTION DATE: 1/4/13

REPORT DATE: 1/9/13

Performed By: Mark Kidd

SEE ATTACHMENT 1

13. DISCHARGE(S) LOCATION DESCRIPTION: Provide USGS Topo which indicates the discharge location, significant (large) discharger(s) to the receiving stream, water intakes, and other items of interest.

Name of Topo: Poquoson West Quadrant No.: 65B SEE ATTACHMENT 2

14. ATTACH A SCHEMATIC OF THE WASTEWATER TREATMENT SYSTEM(S) [IND. & MUN.]. FOR INDUSTRIAL FACILITIES, PROVIDE A GENERAL DESCRIPTION OF THE PRODUCTION CYCLE(S) AND ACTIVITIES. FOR MUNICIPAL FACILITIES, PROVIDE A GENERAL DESCRIPTION OF THE TREATMENT PROVIDED.

Narrative: This facility provides secondary treatment and enhanced nutrient removal. Treatment is provided by screening, grit removal, primary clarification, aeration, secondary clarification, chlorination and dechlorination. Biosolids are treated by anaerobic digestion, gravity belt thickening, and centrifuge dewatering prior to disposal. Biosolids are treated for composting by McGill Environmental Systems (VPA00837). As a backup plan, Biosolids can be incinerated at another HRSD facility, primarily Boat Harbor STP or landfilled at Bethel Landfill in Hampton VA.

SEE ATTACHMENT 3

15. DISCHARGE DESCRIPTION: Describe each discharge originating from this facility.

SEE TABLE I (OR CAN SUBSTITUTE PAGE 2C) - SEE ATTACHMENT 4

16. COMBINED TOTAL FLOW:

TOTAL: 15 MGD (for public notice)

PROCESS FLOW: _____ MGD (IND.)

NONPROCESS/RAINFALL DEPENDENT FLOW: 0.085 (Est.) (No exposure certification granted for SW outfalls)

DESIGN FLOW: 15 MGD (MUN.)

17. STATUTORY OR REGULATORY BASIS FOR EFFLUENT LIMITATIONS AND SPECIAL CONDITIONS:
(Check all which are appropriate)

☒ State Water Control Law
☒ Clean Water Act
☒ VPDES Permit Regulation (9 VAC 25-31-10 et seq.)
☒ EPA NPDES Regulation (Federal Register)
☒ EPA Effluent Guidelines (40 CFR 133 or 400 - 471)
☒ Water Quality Standards (9 VAC 25-260-5 et seq.)
☐ Wasteload Allocation from a TMDL or River Basin Plan

18. EFFLUENT LIMITATIONS/MONITORING: Provide all limitations and monitoring requirements being placed on each outfall.

SEE TABLE II - ATTACHMENT 5

19. **EFFLUENT LIMITATIONS/MONITORING RATIONALE:** Attach any analyses of an outfall by individual toxic parameter. As a minimum, it will include: statistics summary (number of data values, quantification level, expected value, variance, covariance, 97th percentile, and statistical method); wasteload allocation (acute, chronic and human health); effluent limitations determination; input data listing. Include all calculations used for each outfall and set of effluent limits and those used in any model(s). Include all calculations/documentation of any antidegradation or anti-backsliding issues in the development of any limitations; complete the review statements below. Provide a rationale for limiting internal waste streams and indicator pollutants. Attach chlorine mass balance calculations, if performed. Attach any additional information used to develop the limitations, including any applicable water quality standards calculations (acute, chronic and human health).

OTHER CONSIDERATIONS IN LIMITATIONS DEVELOPMENT:

VARIANCES/ALTERNATE LIMITATIONS: Provide justification or refutation rationale for requested variances or alternatives to required permit conditions/limitations. This includes, but is not limited to: waivers from testing requirements; variances from technology guidelines or water quality standards; WER/translator study consideration; variances from standard permit limits/conditions.

No variances were given during this permit reissuance.

SUITABLE DATA: In what, if any, effluent data were considered in the establishment of effluent limitations and provide all appropriate information/calculations.

All suitable effluent data were reviewed.

ANTIDEGRADATION REVIEW: Provide all appropriate information/calculations for the antidegradation review.

The receiving stream has been classified as tier 1; therefore, no further review is needed. Permit limits have been established by determining wasteload allocations which will result in attaining and/or maintaining all water quality criteria which apply to the receiving stream, including narrative criteria. These wasteload allocations will provide for the protection and maintenance of all existing uses.

ANTIBACKSLIDING REVIEW: Indicate if antibacksliding applies to this permit and, if so, provide all appropriate information.

There are no backsliding issues to address in this permit (i.e., limits as stringent or more stringent when compared to the previous permit).

SEE ATTACHMENT 6

20. **SPECIAL CONDITIONS RATIONALE:** Provide a rationale for each of the permit's special conditions.

SEE ATTACHMENT 7

21. **TOXICS MONITORING/TOXICS REDUCTION AND WET LIMIT SPECIAL CONDITIONS RATIONALE:** Provide the justification for any toxics monitoring program and/or toxics reduction program and WET limit.

SEE ATTACHMENT 8

22. **SLUDGE DISPOSAL PLAN:** Provide a description of the sludge disposal plan (e.g., type sludge, treatment provided and disposal method). Indicate if any of the plan elements are included within the permit.

Sludge from this facility is dewatered with centrifuges and then composted by McGill Inc. The primary back-up plan is to haul the sludge to the HRSD Boat Harbor for incineration or to send to Bethel Landfill in Hampton, VA.

23. **MATERIAL STORED:** List the type and quantity of wastes, fluids, or pollutants being stored at this facility. Briefly describe the storage facilities and list, if any, measures taken to prevent the stored material from reaching State waters.

The materials stored on site include sodium hypochlorite, sodium bisulfate, sodium hydroxide, ferric chloride, methanol, ferric sulfate, hydrochloric acid, phosphoric acid, polymer, fuel oil, propane, ammonia, gasoline and diesel fuel. The materials are either stored in buildings with drains connected to the treatment system or are in contained areas. Fuel tanks are double walled.

24. **RECEIVING WATERS INFORMATION:** Refer to the State Water Control Board's Water Quality Standards [e.g., River Basin Section Tables (9 VAC 25-260-5 et seq.)]. Use 9 VAC 25-260-140 C (introduction and numbered paragraph) to address tidal waters where fresh water standards would be applied or transitional waters where the most stringent of fresh or salt water standards would be applied. Attach any memoranda or other information which helped to develop permit conditions (i.e. tier determinations, PReP complaints, special water quality studies, STORET data and other biological and/or chemical data, etc.

SEE ATTACHMENT 9

25. **305(b)/303(d) Listed Segments:** Indicate if the facility discharges to a segment that is listed on the current 303(d) list and, if so, provide all appropriate information/calculations.

This facility discharges directly to the York River. This receiving stream segment has been listed in Category 5 of the 305(b)/303(d) list for non-attainment of Nitrogen, Phosphorus, and TSS. EPA approved the Chesapeake Bay TMDL on 12/29/10. for this segment. It contains a wasteload allocation for this discharge of the above parameters. This permit did receive an individual annual WLA, which is presented as Edge of Stream (EOS):

TN (lbs/yr): EOS 274,100

TP (lbs/yr): EOS 18,273

TSS (lbs/yr): EOS 1,370,502

This permit contains limits of 1703 kg/day monthly average TSS and 2555 kg/day weekly average TSS which means the EOS is less than the EOS in the TMDL therefore TSS is in compliance with the TMDL. The York River HRSD facility is covered under the Nutrient General Permit VAN030052 for the loads of TN and TP. Load limits are contained within the GP, not the individual permit. Per DEQ Central Office- The TMDL includes load limits for the HRSD facilities and the GP requires that they meet those load limits in aggregate. The individual WLAs under the aggregate registrations are listed on the registration list for informational purposes only. The York River plant doesn't have to meet their individual WLA. The 3 HRSD York River plants only have to meet their aggregate delivered WLA (which includes the 4th WLA from Mathews CH).

This facility discharges stormwater directly to Back Creek. This receiving stream segment has been listed in Category 5 of the 303(d) list for non-attainment of fecal coliform. EPA approved the Poquoson River and Back Creek TMDL on 3/19/14 and

SWCB approved on 6/30/14 for this segment. The facility was not assigned an individual waste load allocation for fecal coliform and enterococci.

26. CHANGES TO PERMIT: Use TABLE III(a) to record any changes from the previous permit and the rationale for those changes. Use TABLE III(b) to record any changes made to the permit during the permit processing period and the rationale for those changes [i.e., use for comments from the applicant, VDH, EPA, other agencies and/or the public where comments resulted in changes to the permit limitations or any other changes associated with the special conditions or reporting requirements].

SEE ATTACHMENT 10

27. NPDES INDUSTRIAL PERMIT RATING WORKSHEET:

N/A - This is a municipal facility.

28. DEQ PLANNING COMMENTS RECEIVED ON DRAFT PERMIT: Document any comments received from DEQ planning.

The discharge is in conformance with the existing planning documents for the area.

OR

The discharge is not addressed in any planning document but will be included when the plan is updated.

29. PUBLIC PARTICIPATION: Document comments/responses received during the public participation process. If comments/responses provided, especially if they result in changes to the permit, place in the attachment.

VDH/DSS COMMENTS RECEIVED ON DRAFT PERMIT: Document any comments received from the Virginia Dept. of Health and the Div. of Shellfish Sanitation and noted how resolved.

The VDH reviewed the application and waived their right to comment and/or object on the adequacy of the draft permit. Memo received 9/28/15.

The DSS comments to the application are included. Email received 1/13/16.

EPA COMMENTS RECEIVED ON DRAFT PERMIT: Document any comments received from the U.S. Environmental Protection Agency and noted how resolved.

EPA waived the right to comment and/or object to the adequacy of the draft permit.

OR

EPA has no objections to the adequacy of the draft permit.

OR

By letter dated _____, the EPA provided the following comments:

ADJACENT STATE COMMENTS RECEIVED ON DRAFT PERMIT: Document any comments received from an adjacent state and noted how resolved.

Not Applicable.

OTHER AGENCY COMMENTS RECEIVED ON DRAFT PERMIT: Document any comments received from any other agencies (e.g., VIMS, VMRC, DGIF, etc.) and noted how resolved.

Not Applicable.

OTHER COMMENTS RECEIVED FROM RIPARIAN OWNERS/CITIZENS ON DRAFT PERMIT: Document any comments received from other sources and note how resolved.

The application and draft permit have received public notice in accordance with the VPDES Permit Regulation, and no comments were received.

DESCRIBE PN COMMENTS AND RESOLUTIONS. PROVIDE PUBLIC HEARING DATE AND REFERENCE BACKGROUND MEMORANDUM, IF APPROPRIATE.

PUBLIC NOTICE INFORMATION: Comment Period: Start Date
End Date

Persons may comment in writing or by e-mail to the DEQ on the proposed issuance/reissuance/modification of the permit within 30 days from the date of the first notice. Address all comments to the contact person listed below. Written or e-mail comments shall include the name, address, and telephone number of the writer, and shall contain a complete, concise statement of the factual basis for comments. Only those comments received within this period will be considered. The Director of the DEQ may decide to hold a public hearing if public response is significant. Requests for public hearings shall state the reason why a hearing is requested, the nature of the issues proposed to be raised in the public hearing and a brief explanation of how the requestor's interests would be directly and adversely affected by the proposed permit action.

All pertinent information is on file and may be inspected, and arrangements made for copying by contacting Deanna Austin at: Department of Environmental Quality (DEQ), Tidewater Regional Office, 5636 Southern Boulevard, Virginia Beach, VA 23462. Telephone: 757-518-2008 E-mail: deanna.austin@deq.virginia.gov

Following the comment period, the Board will make a determination regarding the proposed issuance/reissuance/modification. This determination will become effective, unless the Director grants a public hearing. Due notice of any public hearing will be given.

30. ADDITIONAL FACT SHEET COMMENTS/PERTINENT INFORMATION:

A revoke and reissue was requested from HRSD in May 2015 in response to the Dominion Yorktown power station shut down. The York River STP has been discharging into the cooling water canal owned by Dominion since plant operation began. In order to maintain dilution ratios, the outfall from the plant will be extended into the York River and a diffuser will be installed. Construction has started for both the land-based portion and the CTC for the offshore portion has been obtained. Modeling was submitted to DEQ for the diffuser and DEQ Central Office concurred with the model in December 2015.

ATTACHMENT 1

SITE INSPECTION REPORT/MEMORANDUM

Facility:	HRSD – YORK RIVER WWTP
County/city:	YORK COUNTY

VPDES NO.	VA0081311
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**DEPARTMENT OF ENVIRONMENTAL QUALITY
WASTEWATER FACILITY
INSPECTION REPORT
PART 1**

Inspection date:	January 4, 2013	Date form completed:	January 9, 2013					
Inspection by:	Mark R. Kidd	Inspection agency:	DEQ/TRO					
Time spent:	8 hours	Announced inspection:	[] Yes [✓] No					
Reviewed by: Kenneth T. Raum	Photographs taken at site? [✓] Yes [] No							
Present at inspection:	Andy Nelson							
FACILITY TYPE:		FACILITY CLASS:						
(✓) Municipal		(✓) Major						
() Industrial		() Minor						
() Federal		() Small						
() VPA/NDC		() High Priority () Low Priority						
TYPE OF INSPECTION:								
Routine		Compliance/assistance/complaint						
✓								
Reinspection								
Date of previous inspection:		Agency:						
May 3, 2011		DEQ/TRO						
Population Served:		Connections Served						
November 2012 Average Influent	CBOD (mg/l)	159	TSS (mg/l)	139	Flow (MGD)	13.09	TP (mg/l)	4.0
	Other:							
November 2012 Average Effluent	BOD ₅ (mg/l)	5	TSS (mg/l)	1.2	Flow (MGD)	13.09	TP (mg/l)	0.37
	Other: TN(mg/l) - 6.4							
3 rd Quarter 2012 Average Effluent	BOD ₅ (mg/l)	4	TSS (mg/l)	1.1	Flow (MGD)	11.89	TP (mg/l)	0.46
	Other: TN(mg/l) - 6.8							
Data verified in preface:	Updated?	NO CHANGES?		✓				
Has there been any new construction?								
YES NO ✓								
If yes, were the plans and specifications approved?								
YES NO NA								
DEQ approval date:	NA							
COPIES TO: (✓) DEQ/TRO; (✓) DEQ/OWCP; (✓) OWNER; () OPERATOR; () EPA-Region III; () Other:								

PLANT OPERATION AND MAINTENANCE

1.	Class/number of licensed operators:	I	II	III	IV	Trainee	
2.	Hours per day plant manned?	24/7					
3.	Describe adequacy of staffing	GOOD	✓	AVERAGE		POOR	
4.	Does the plant have an established program for training personnel	YES				✓	NO
5.	Describe the adequacy of training	GOOD	✓	AVERAGE		POOR	
6.	Are preventative maintenance tasks scheduled	YES				✓	NO
7.	Describe the adequacy of maintenance	GOOD	✓	AVERAGE		POOR	
	Does the plant experience any organic/hydraulic overloading?	YES				✓	NO
8.	If yes, identify cause/impact on plant						
9.	Any bypassing since last inspection?	YES					NO ✓
10.	Is the standby electrical generator operational?	YES		✓	NO		NA
	How often is the standby generator exercised?	Monthly					
11.	Power transfer switch?	✓		ALARM SYSTEM?	✓		
12.	When was the cross connection last tested on the potable supply?	Not checked					
13.	Is the STP alarm system operational?	YES		✓	NO		NA
14.	Is sludge disposed in accordance with an approved SMP	YES		✓	NO		NA
	Is septage received by the facility?	YES				✓	NO
15.	Is septage loading controlled?	YES		✓	NO		NA
	Are records maintained?	YES		✓	NO		NA

OVERALL APPEARANCE OF FACILITY	GOOD	✓	AVERAGE		POOR	
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COMMENTS:	
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PLANT RECORDS

PLANT RECORDS									
WHICH OF THE FOLLOWING RECORDS DOES THE PLANT MAINTAIN?									
1.	Operational logs for each process unit				YES	✓	NO		NA
	Instrument maintenance and calibration				YES	✓	NO		NA
	Mechanical equipment maintenance				YES	✓	NO		NA
	Industrial waste contribution (municipal facilities)				YES	✓	NO		NA
WHAT DOES THE OPERATIONAL LOG CONTAIN									
2.	Visual Observations	✓	Flow Measurement	✓	Laboratory Results				
	Process Adjustments	✓	Control Calculations		Other?				
COMMENTS:									
WHAT DO THE MECHANICAL EQUIPMENT RECORDS CONTAIN?									
3.					NA				
	MFG. Instructions	✓	As Built Plans/specs	✓	Spare Parts Inventory			✓	
	Lube Schedules	✓	Other?		Equipment/parts Suppliers			✓	
COMMENTS:									
WHAT DO INDUSTRIAL WASTE CONTRIBUTION RECORDS CONTAIN? (MUNICIPAL)									
4.					NA				
	Waste Characteristics			✓	Impact on Plant			✓	
	Location and Discharge Types			✓	Other?				
COMMENTS:									
WHICH OF THE FOLLOWING RECORDS ARE AT THE PLANT & AVAILABLE TO PERSONNEL?									
5.					NA				
	Equipment Maintenance Records		✓	Industrial Contributor Records			✓		
	Operational Log	✓	Sampling/testing Records		✓	Instrumentation Records			✓
6.	Records not normally available to personnel at their location:								
7.	Were the records reviewed during the inspection						YES	✓	NO
8.	Are records adequate and the O&M manual current?						YES	✓	NO
9.	Are the records maintained for the required 3-year time period						YES	✓	NO
COMMENTS:									

SAMPLING

1.	Are sampling locations capable of providing representative samples?	YES	✓	NO	
2.	Do sample types correspond to VPDES permit requirements?	YES	✓	NO	
3.	Do sampling frequencies correspond to VPDES permit requirements?	YES	✓	NO	
4.	Does plant maintain required records of sampling?	YES	✓	NO	
5.	Are composite samples collected in proportion to flow?	YES	✓	NO	NA
6.	Are composite samples refrigerated during collection?	YES	✓	NO	NA
7.	Does the plant run operational control tests?	YES	✓	NO	NA

COMMENTS:

TESTING

1.	Who performs the testing?	Plant	✓	Central Lab	✓	Commercial Lab	
	Name:						

IF THE PLANT PERFORMS ANY TESTING, PLEASE COMPLETE QUESTIONS 2-4

2.	Which total residual chlorine method is used?	Hach Pocket Colorimeter				
3.	Does plant appear to have sufficient equipment to perform required tests?	YES	✓	NO		
4.	Does testing equipment appear to be clean and/or operable?	YES	✓	NO		

COMMENTS:

FOR INDUSTRIAL FACILITIES WITH TECHNOLOGY BASED LIMITS ONLY

1.	Is the production process as described in permit application? If no, describe changes in comments section.	YES		NO		NA	✓
2.	Are products/production rates as described in the permit application? If no list differences in comments section.	YES		NO		NA	✓
3.	Has the Agency been notified of the changes and their impact on plant effluent? Date agency notified:	YES		NO		NA	✓

COMMENTS:

PROBLEMS IDENTIFIED AT LAST INSPECTION:		CORRECTED	NOT CORRECTED
	None		

SUMMARY

INSPECTION COMMENTS:	
	In arrived on site and met with Plant Manager Andy Nelson. No problems or deficiencies were noted during the inspection.
COMPLIANCE RECOMMENDATIONS FOR ACTION	
	None at this time.

DEPARTMENT OF ENVIRONMENTAL QUALITY
WASTEWATER FACILITY
INSPECTION REPORT
PART II

Unit Process Evaluation Summary Sheet*

UNIT PROCESS	APPLICABLE	COMMENTS
FLOW MEASUREMENT	✓	
SCREENING/COMMINUTION	✓	
GRIT REMOVAL	✓	
PRIMARY SEDIMENTATION	✓	
SECONDARY SEDIMENTATION	✓	
ACTIVATED SLUDGE AERATION	✓	
FILTRATION	✓	
CHLORINATION	✓	
DECHLORINATION	✓	
EFFLUENT/PLANT OUTFALL	✓	
FLOTATION THICKENING (DAF)	✓	
GRAVITY THICKENING	✓	
ANAEROBIC DIGESTION	✓	
CENTRIFUGATION	✓	

STANDARD COMMENTS:

- | | |
|----------------------------------|--|
| 1. UNIT NEEDS ATTENTION | 4. UNAPPROVED MODIFICATION OR TEMPORARY REPAIR |
| 2. ABNORMAL INFLUENT/EFFLUENT | 5. EVIDENCE OF PROCESS UPSET |
| 3. EVIDENCE OF EQUIPMENT FAILURE | |

*REFER TO INDIVIDUAL UNIT PROCESS EVALUATION

UNIT PROCESS:

SCREENINGS/COMMINUTION

				YES	NO	NA
1.	Number of manual units	2				
2.	Number of mechanical units	2				
3.	Number manual units in operation	0				
4.	Number of mechanical units in operation	2				
	Bypass channel provided			✓		
5.	Bypass channel in use				✓	
6.	Area adequately ventilated			✓		
7.	Alarm system for equipment failure and/or overloads			✓		
8.	Proper flow distribution between units			✓		
9.	How often are units checked and cleaned	1x per 2 hours				
10.	Cycle of operation	continuous				
11.	Volume of screenings removed	63ft ³ /day				
GENERAL CONDITION:		GOOD	✓	FAIR		POOR

COMMENTS:

Photo 2. #11 – November 2012 average.

UNIT PROCESS:

GRIT REMOVAL

				YES	NO	NA
1.	Number of units	3				
2.	Number units in operation	2				
Operation of grit collection equipment:						
3.	Manual	Time Clock		✓	Continuous Duty	
4.	Area adequately ventilated			✓		
5.	Proper flow distribution between units			✓		
6.	Daily volume of grit removed	19ft ³ /day				
7.	All equipment operable			✓		
GENERAL CONDITION:		GOOD	✓	FAIR		POOR

COMMENTS:

Photo 1. #6- November 2012 average.

UNIT PROCESS:	SEDIMENTATION
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	PRIMARY	✓	SECONDARY		TERTIARY		YES	NO	NA
1.	Number of units				3				
2.	Number units in operation				2				
3.	Proper flow distribution between units						✓		
4.	Sludge collection system working properly?						✓		
5.	Signs of short circuiting and/or overloads							✓	
6.	Effluent weirs level						✓		
7.	Effluent weirs clean						✓		
8.	Scum collection system working properly						✓		
9.	Influent/effluent baffle system working properly						✓		
10.	Chemical Used	Ferrous Chloride for phosphorus removal				Chemical Addition	✓		
11.	Effluent characteristics								
GENERAL CONDITION:			GOOD		✓	FAIR		POOR	

COMMENTS:	#10 - 684 lbs/day of FeCl ₃ Photo 3.
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UNIT PROCESS:	SEDIMENTATION
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	PRIMARY		SECONDARY	✓	TERTIARY		YES	NO	NA
1.	Number of units				3				
2.	Number units in operation				3				
3.	Proper flow distribution between units						✓		
4.	Sludge collection system working properly?						✓		
5.	Signs of short circuiting and/or overloads							✓	
6.	Effluent weirs level						✓		
7.	Effluent weirs clean						✓		
8.	Scum collection system working properly						✓		
9.	Influent/effluent baffle system working properly						✓		
10.	Chemical Used	Polymer and ferrous chloride				Chemical Addition	✓		
11.	Effluent characteristics				clear				
GENERAL CONDITION:			GOOD		✓	FAIR		POOR	

COMMENTS:	#10 – 399 lbs/day FeCl ₃ , A-3320 polymer used 14 days in November averaging 57lbs/day. Photo 5.
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UNIT PROCESS:	ACTIVATED SLUDGE
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								YES	NO	NA	
1.	Number of aeration units		6								
2.	Number units in operation		6								
3.	Mode of operation:		Step flow								
4.	Proper flow distribution between units							✓			
5.	Foam control operational							✓			
6.	Scum control present							✓			
7.	Dead spots								✓		
8.	Excessive foam								✓		
9.	Poor aeration								✓		
10.	Excessive scum								✓		
11.	Aeration equipment malfunction								✓		
12.	Other problem(s):								✓		
13.	Effluent control devices working properly (OXIDATION DITCHES)									✓	
14.	MIXED LIQUOR CHARACTERISTICS AS AVAILABLE:										
	pH (s.u.)	6.5	MLSS (mg/l)	3317	DO (mg/l)		SVI				102
	Odor	earthy	MCRT		10 days		SDI				
	Color	brown									
15.	RETURN/WASTE SLUDGE RATES:										
	Return Rate	8.63 MGD	Waste Rate		Waste Frequency	daily					
16.	AERATION SYSTEM CONTROL:										
	Time Clock		Manual Feed		Continuous Feed	✓					
	Other:										

GENERAL CONDITION:	GOOD	✓	FAIR		POOR	
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COMMENTS:	Photo 4.
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UNIT PROCESS:	DENITRIFICATION FILTER
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								YES	NO	NA
1.	Number of units			9						
2.	Number units in operation			9						
3.	Mode of operation:		Continuous							
4.	Proper flow distribution between units							✓		
5.	FILTER INFLUENT									
	Flow (MGD)	13.84	NO ₃ -N (mg/l)	15.33	Chemicals Used? Methanol	✓				
					Chemical Dosage (mg/l)	65 as COD				
6.	FILTER EFFLUENT									
	NO ₃ -N (mg/l)	2.92								
	Other:									

GENERAL CONDITION:	GOOD	✓	FAIR		POOR	
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COMMENTS:	Photos 7&8. #5&6 November 2012.
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UNIT PROCESS:	FLOW MEASUREMENT
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	INFLUENT	<input checked="" type="checkbox"/>	INTERMEDIATE	<input type="checkbox"/>	EFFLUENT	<input type="checkbox"/>	YES	NO	NA
1.	Type of measuring device	Ultrasonic							
2.	Present reading?								
3.	Bypass channel							<input checked="" type="checkbox"/>	
4.	Bypass channel metered?								<input checked="" type="checkbox"/>
	Return flow discharged upstream of the meter?								<input checked="" type="checkbox"/>
5.	Identify:								
6.	Device operating properly?						<input checked="" type="checkbox"/>		
7.	Date of last calibration?	November 15,2012							
	EVIDENCE OF THE FOLLOWING PROBLEMS								
	Obstruction?							<input checked="" type="checkbox"/>	
8.	Grease?							<input checked="" type="checkbox"/>	

GENERAL CONDITION:	GOOD	<input checked="" type="checkbox"/>	FAIR	<input type="checkbox"/>	POOR	<input type="checkbox"/>
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COMMENTS:	
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UNIT PROCESS:	CHLORINATION
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							YES	NO	NA
1.	Number of chlorinators	6							
2.	Number chlorinators in operation	1-2							
3.	Number of evaporators?	0							
4.	Number of evaporators in operation	0							
5.	Number chlorine contact tanks	2							
6.	Number chlorine contact tanks in operation	1							
7.	Proper flow distribution between units?								✓
	HOW IS CHLORINE INTRODUCED INTO THE WASTE STREAM?								
8.	Perforated Diffuser	✓	Injector w/single entry point		Tablet Feeder				
9.	Chlorine residual in contact basin effluent (mg/l) Nov 2012		1.05						
10.	Applied chlorine dosage (lbs/day)		376						
11.	Contact basin adequately baffled?						✓		
12.	Adequate ventilation in chlorine cylinder storage area?								✓
14.	Adequate ventilation in chlorine equipment room?								✓
15.	Proper safety precautions used?						✓		

GENERAL CONDITION:	GOOD	✓	FAIR		POOR	
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COMMENTS:	
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UNIT PROCESS:	DECHLORINATION
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						YES	NO	NA	
1.	Dechlorination chemical used?								
	Sulfur Dioxide		Bisulfite	✓	Other:				
2.	Number of sulfonators				5				
3.	Number sulfonators in operation				1				
4.	Number of evaporators?				0				
5.	Number of evaporators in operation				0				
5.	Number contact tanks				2				
6.	Number contact tanks in operation				1				
7.	Proper flow distribution between units?							✓	
8.	HOW IS CHEMICAL INTRODUCED INTO THE WASTE STREAM?								
	Perforated Diffuser	✓	Injector w/single entry point		Tablet Feeder				
9.	Chlorine residual in basin effluent November 2012				0.04 mg/l				
10.	Applied dechlorination dosage November 2012				238 lbs/day				
11.	Control system operational?					✓			
12.	Control system adjusted?	Automatic	✓	Manual	Other:				
13.	Residual analyzer?						✓		
14.	Contact basin adequately baffled?					✓			
15.	Adequate ventilation in cylinder storage area?							✓	
16.	Adequate ventilation in equipment room?							✓	
17.	Proper safety precautions used?					✓			

GENERAL CONDITION:	GOOD	✓	FAIR		POOR	
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COMMENTS:	Photo 6.
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UNIT PROCESS:	EFFLUENT/PLANT OUTFALL
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								YES	NO	NA
1.	Type of outfall	Shore Based		✓	Submerged					
TYPE IF SHORE BASED:										
2.	Wingwall		Headwall		Rip Rap		Pipe	✓		
3.	Flapper valve present?									✓
4.	Erosion of bank area?									✓
5.	Effluent plume visible?									✓
Condition of outfall and the supporting structure?										
6.	GOOD		FAIR		POOR					
FINAL EFFLUENT, EVIDENCE OF FOLLOWING PROBLEMS?										
Oil sheen?									✓	
Grease?									✓	
Sludge bar?									✓	
Turbid effluent?									✓	
Visible foam?									✓	
7.	Unusual color?								✓	

GENERAL CONDITION:	GOOD		FAIR		POOR	
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COMMENTS:	6&7. Effluent was observed at the de-chlorination unit. The outfall is located at the Yorktown Power Station.
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UNIT PROCESS:	FLOTATION THICKENING (DAF)
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					YES	NO	NA
1.	Number of units	2					
2.	Number units in operation	1					
SLUDGE PUMPING?							
3.	Manual		Automatic	✓	Other:		
FLOTATION AID SYSTEM PROVIDED?							
4.	Type of aid	SE-1084		Dosage	37 lbs/day		
5.	Skimmer blade sludge removal system properly operating?					✓	
6.	Sludge collection system working properly?					✓	✓
	Is the unit used to thicken sludge other than waste activated sludge?						✓
7.	Other sludge type						✓
8.	Signs of overloading?						✓
PROCESS CONTROL TESTING							
	Feed solids testing			%			
	Thickened sludge solids testing			4.09 %			
	Underflow testing			mg/L			
9.	Other:						
10.	Percent capture of solids			64 %			
11.	Effluent baffle system working properly?					✓	

GENERAL CONDITION:	GOOD	✓	FAIR		POOR	
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COMMENTS:	Photo 9.
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UNIT PROCESS:	GRAVITY THICKENER
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							YES	NO	NA			
1.	Number of units			2								
2.	Number units in operation			1								
3.	Type of sludge treated:				Combination							
	Primary	✓	Waste Activated		Other:							
4.	Sludge fed how?		Continuous		✓					Intermittent		
5.	Solids concentration in the influent sludge											
	Solids concentration in the thickened sludge											
6.	Signs of short-circuiting and/or overloading?							✓				
7.	Effluent weirs level?						✓					
8.	Sludge collection system working properly?						✓					
9.	Influent/effluent baffle systems working properly?						✓					
10.	Chemical addition?						✓					
	Chemical used?	NaOCl A3320		Dosage?	214 lbs/day 22 lbs/day							

GENERAL CONDITION:	GOOD	✓	FAIR		POOR	
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COMMENTS:	Photo 10.
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UNIT PROCESS:	CENTRIFUGATION
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					YES	NO	NA		
1.	Number of units		2						
2.	Number units in operation		1						
PURPOSE OF CENTRIFUGE									
3.	Thickening		Dewatering	✓				Other:	
OPERATION OF EQUIPMENT									
4.	Manual	✓	Automatic					Other:	
5.	Centrifuge run time November 2012		14 hrs/day for 25 days						
6.	Volume of influent sludge flow: (gal/min)		70						
7.	Amount of cake produced: (lbs/day)								
SLUDGE SOLIDS									
8.	Influent (%)	2.95	Effluent (%)						
9.	Conditioning chemical fed:		SE-1084						
10.	Conditioning chemical dose:		220 lbs/day						
11.	Centrate return location:								
12.	Signs of centrate return problems?						✓		

GENERAL CONDITION:	GOOD		FAIR		POOR	
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COMMENTS:	All data based on November 2012 process control information.
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UNIT PROCESS:

ANAEROBIC DIGESTION

										YES	NO	NA				
1.	Number of units				2											
2.	Number units in operation				1											
3.	TYPE OF SLUDGE TREATED:															
	Primary	✓	Waste Activated	✓	Other:											
4.	TYPE OF DIGESTER:															
	Primary:		Standard Rate		High Rate		Secondary	✓								
5.	Frequency of sludge application to digester(s):					continuous										
6.	pH Adjustment provided?											✓				
7.	pH adjustment utilized?												✓			
8.	Number of recirculation pumps															
9.	Number recirculation pumps in operation															
	LOCATION OF SUPERNATANT RETURN:															
10.	Head		Primary		Other:											
11.	Supernatant return rate:															
	PROCESS CONTROL TESTING:															
	pH (s.u.)	6.8-7.0														
	Volatile Acids (mg/l)	37														
	Alkalinity (mg/l)	2533														
	Volatile Solids Reduction (%)	2.94														
12.	Temperature (°F)	99														
13.	Sludge retention time?		16													
14.	Gas production rate?		167x1000ft ³ /day													
15.	Signs of overloading?											✓				

GENERAL CONDITION:	GOOD		FAIR		POOR	
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COMMENTS:	Photo 11. The roof for Digester #2 was replaced with a dome roof.
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Photo 1. Grit classifier.



Photo 2. Bar screen.

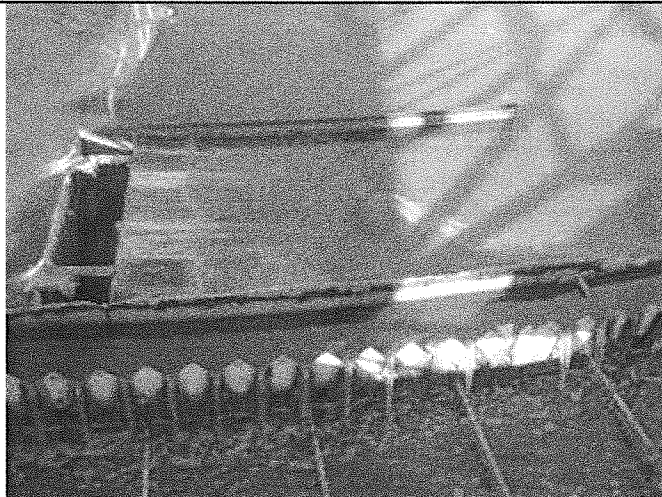


Photo 3. Primary clarifier.



Photo 4. Activated sludge tank.

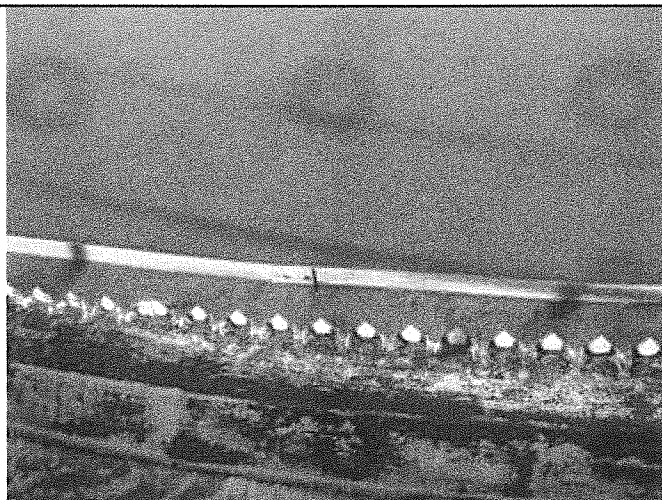


Photo 5. Secondary clarifier.

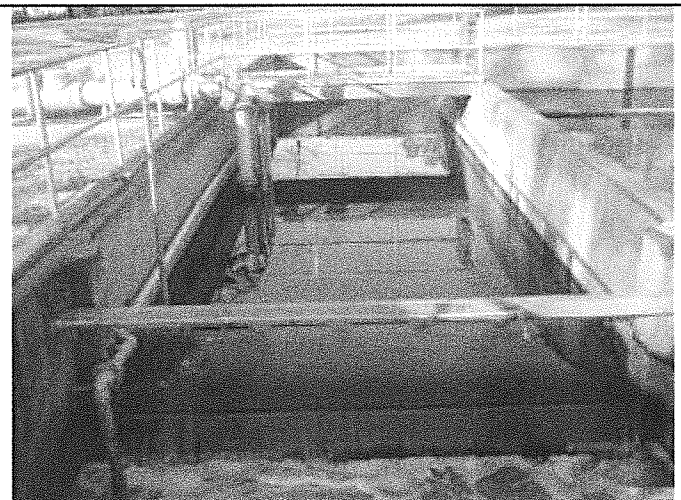


Photo 6. Dechlorination unit.

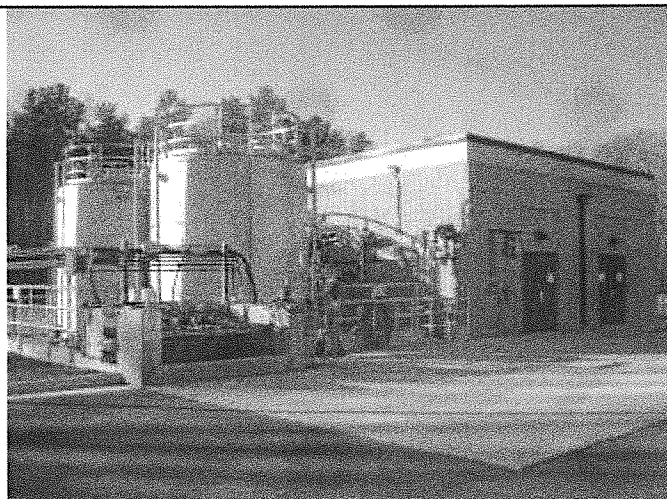


Photo 7. Denitrification building.



Photo 8. Denitrification tank.



Photo 9. DAF unit.



Photo 10. Gravity thickener.

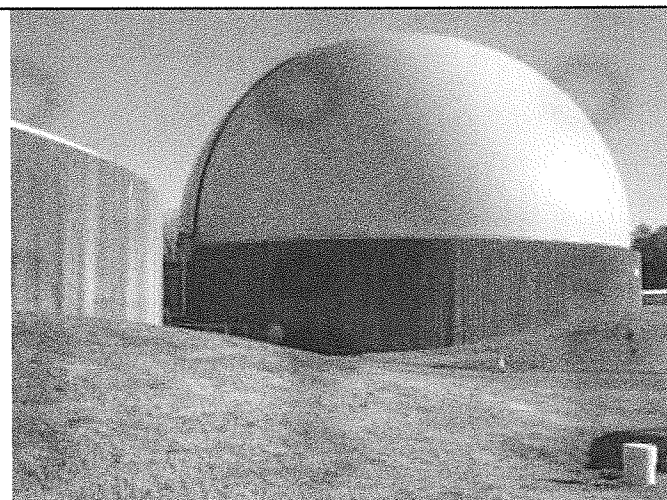
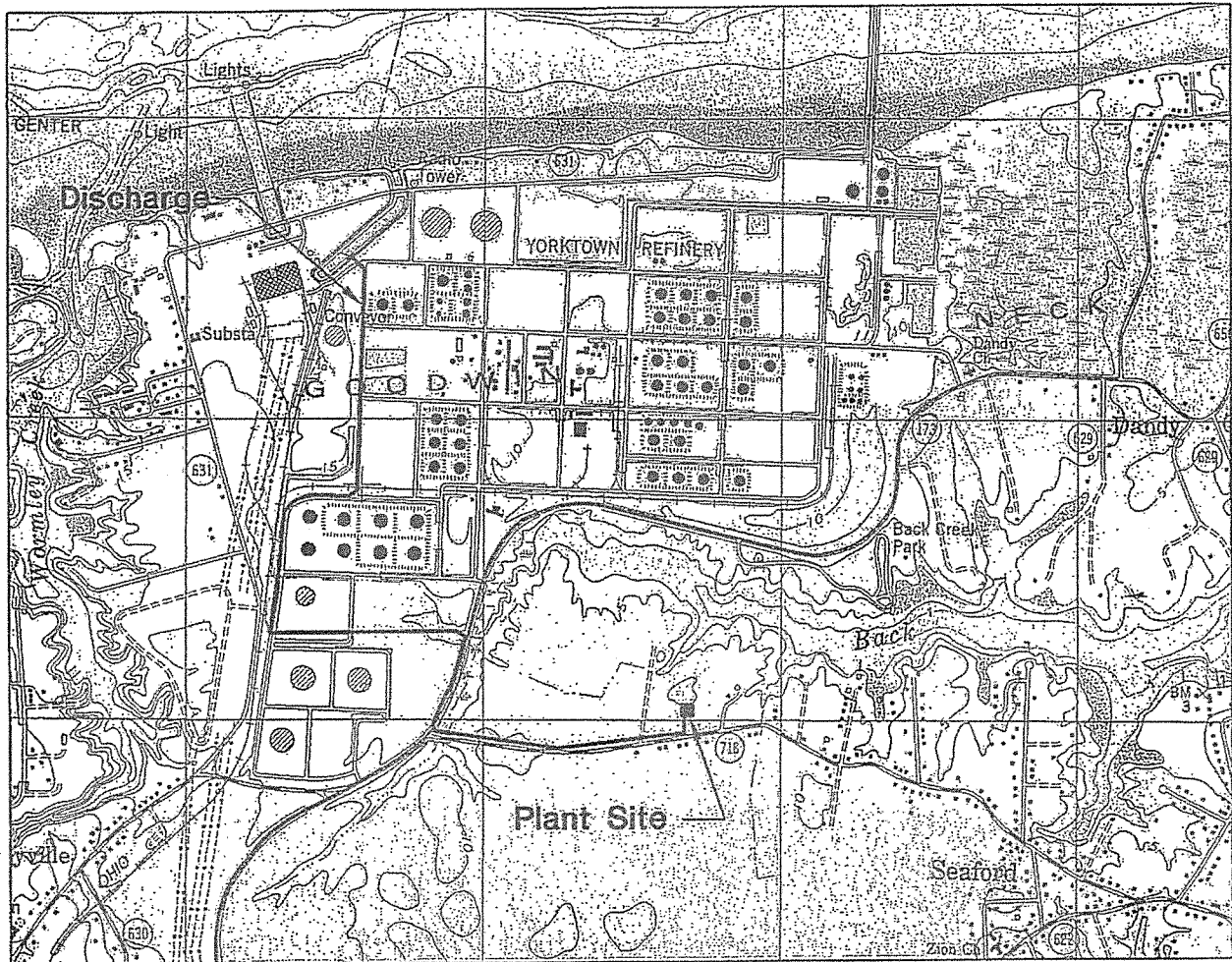


Photo 11. Anaerobic digester.

ATTACHMENT 2

DISCHARGE LOCATION/TOPOGRAPHIC MAP

Current outfall location



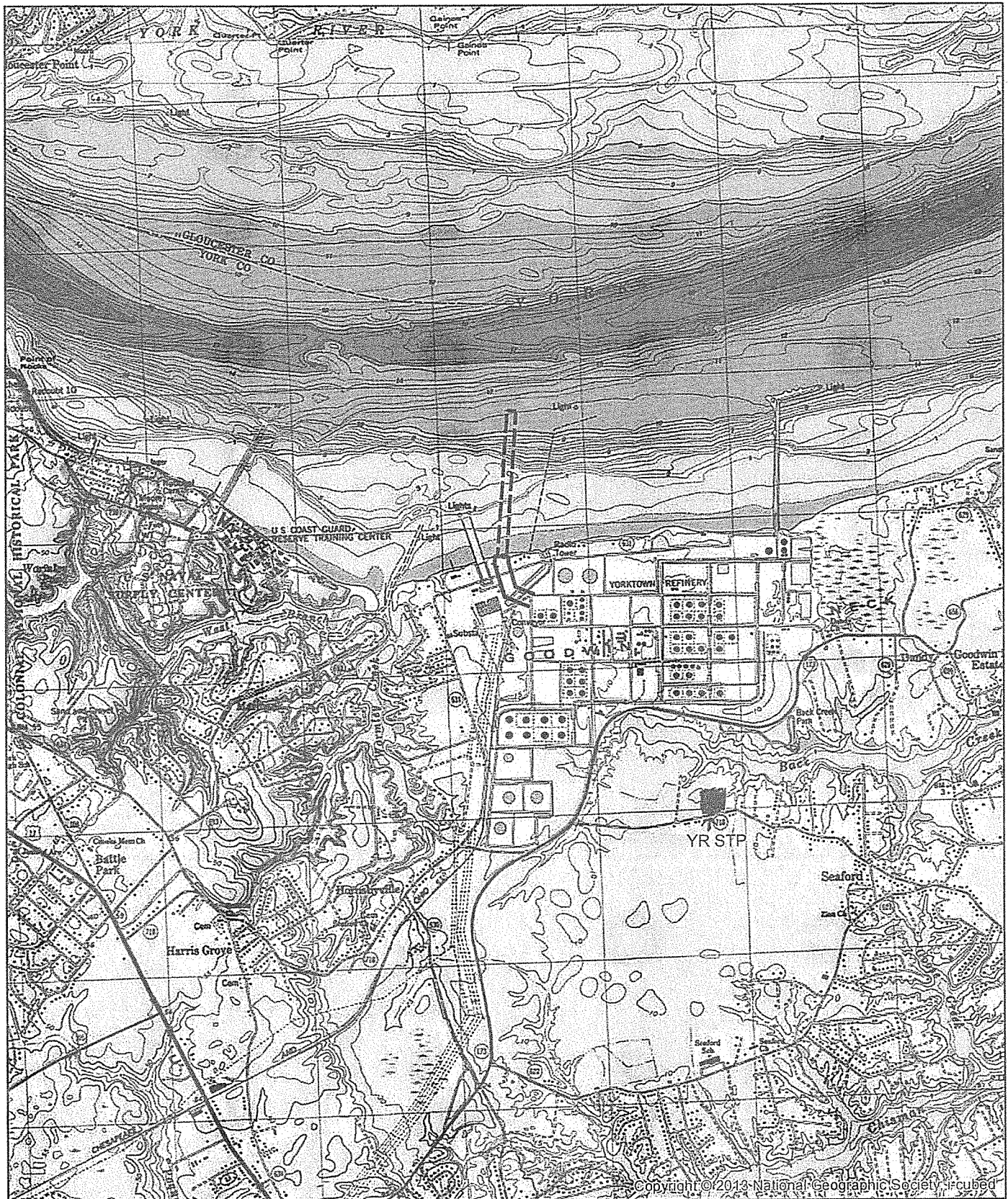
Location Map
for
York River TP

June 2003

Scale: 1"=2000'

USGS Map Reference

Proposed outfall location



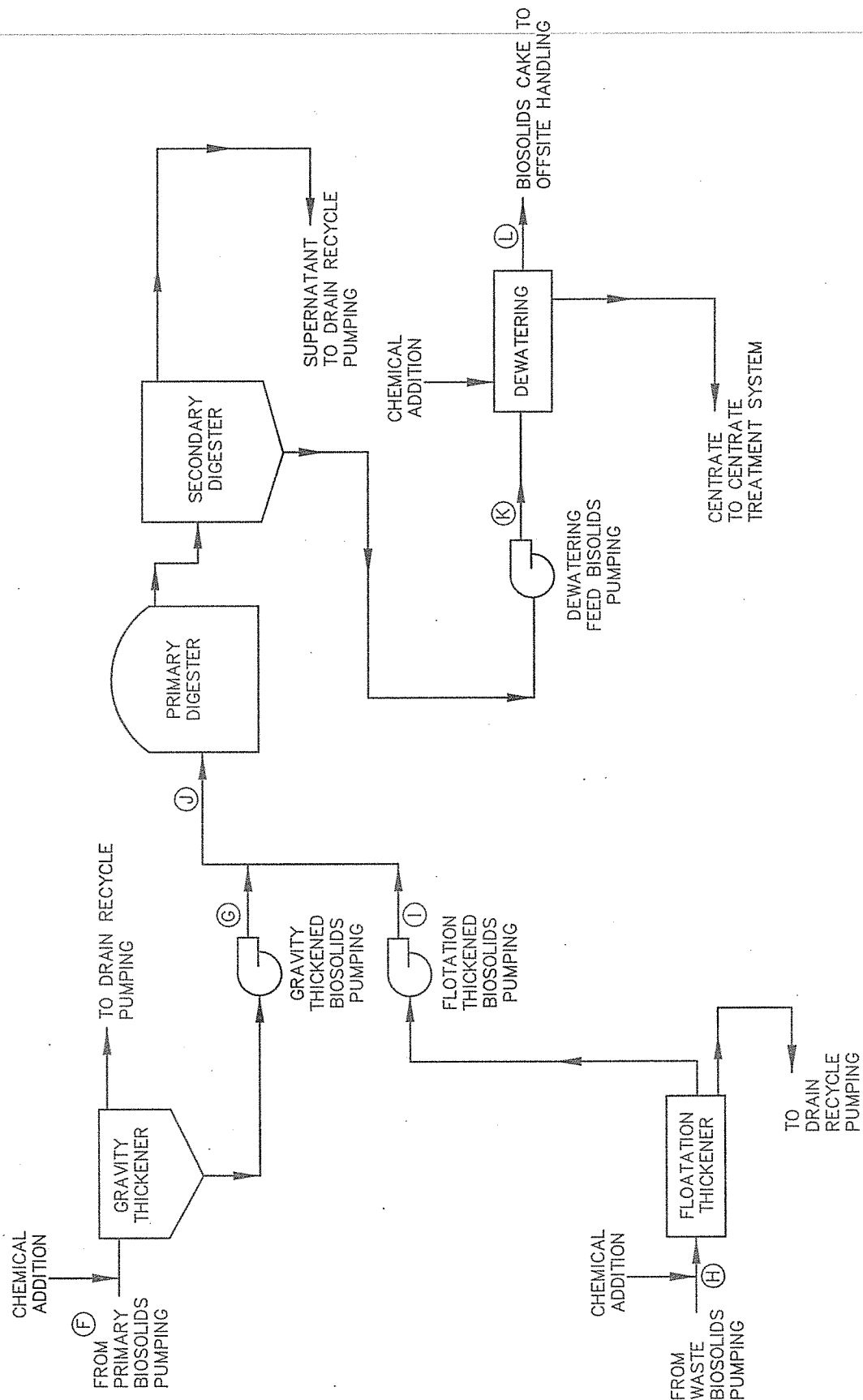
HRSD
York River Outfall and Diffuser

FIGURE 3
USGS TOPO MAPPING

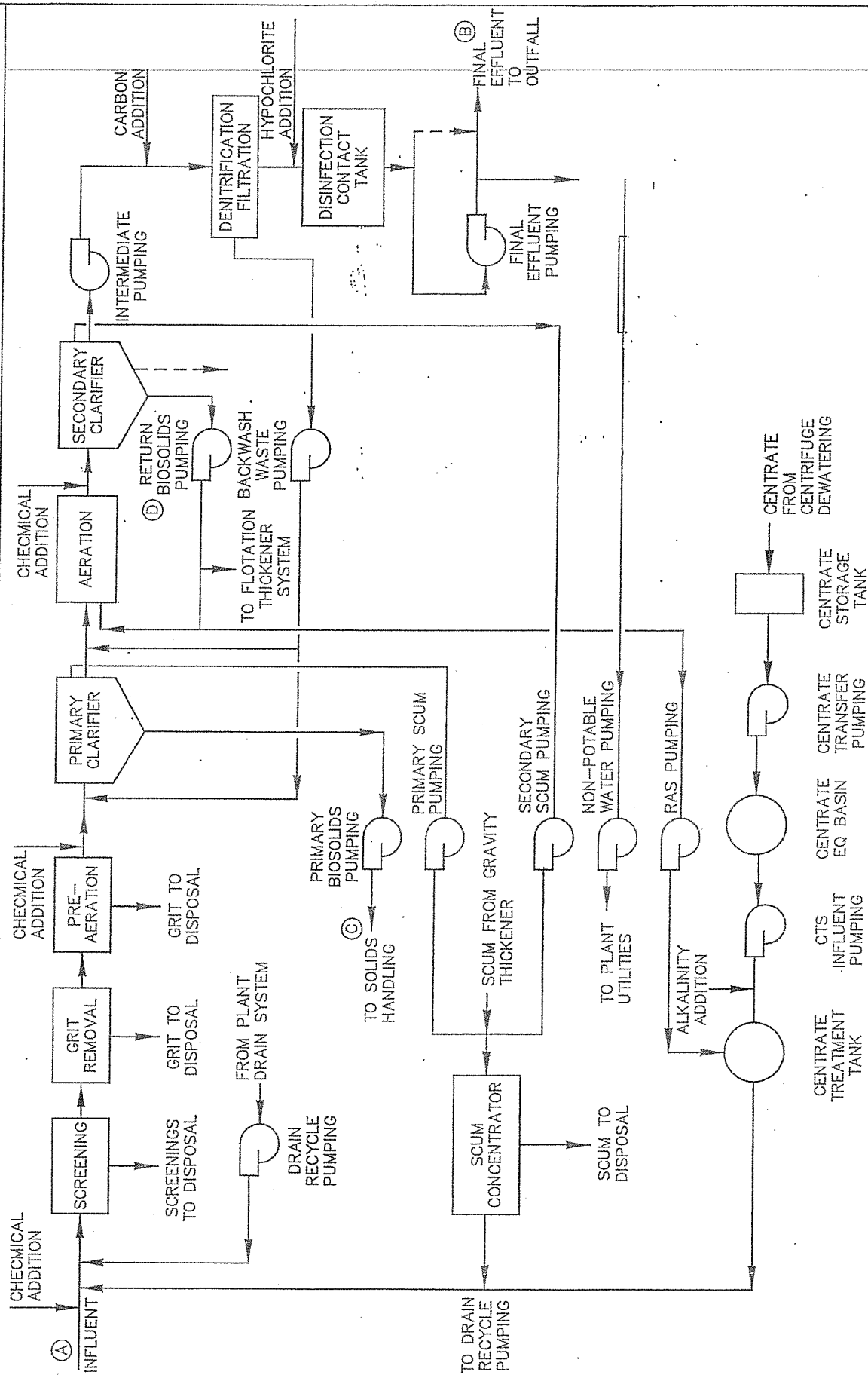
ATTACHMENT 3

SCHEMATIC/PLANS & SPECS/SITE MAP/
WATER BALANCE

YORK RIVER TREATMENT PLANT
SOLIDS HANDLING FLOW DIAGRAM
HAMPTON ROADS SANITATION DISTRICT



YORK RIVER TREATMENT PLANT SEWAGE TREATMENT FLOW DIAGRAM HAMPTON ROADS SANITATION DISTRICT



ATTACHMENT 4

TABLE I - DISCHARGE/OUTFALL DESCRIPTION

TABLE I

NUMBER AND DESCRIPTION OF OUTFALLS

OUTFALL NO.	DISCHARGE LOCATION	DISCHARGE SOURCE (1)	TREATMENT (2)	FLOW (3)
001	371255N/0 762731W	Publicly Owned Treatment works	Secondary treatment including bar screen, grit removal, primary clarification, secondary clarification, activated sludge, chlorination and dechlorination.	15 MGD
002	371212N/ 0762646W	Stormwater	Good housekeeping and management, containment of stored materials	0.039 MG
003	371218N/ 0762648W	Stormwater	Good housekeeping and management, containment of stored materials	0.007 MG
005	371207N/ 0762652W	Stormwater	Good housekeeping and management, containment of stored materials	0.007 MG
006	371207N/ 0762708W	Stormwater	Good housekeeping and management, containment of stored materials	0.018 MG
007	371218N/ 0762659W	Stormwater	Good housekeeping and management, containment of stored materials	0.014 MG

(1) List operations contributing to flow

(2) Give brief description, unit by unit

(3) Give maximum 30-day average flow for industry and design flow for municipal

SEE ATTACHED SHEET FOR CALCULATIONS

Outfall 004 was deleted during a previous plant upgrade.

ATTACHMENT 5

TABLE II - EFFLUENT MONITORING/LIMITATIONS

TABLE II - INDUSTRIAL EFFLUENT LIMITATIONS/MONITORING

OUTFALL # 001

DESIGN FLOW: 15 MGD

Outfall Description: Municipal Discharge

SIC CODE: 4952

(X) Final Limits () Interim Limits Effective Dates - From: Reissuance To: Expiration

PARAMETER & UNITS	BASIS FOR LIMITS	DESIGN FLOW MULTIPLIER	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
			MONTHLY AVERAGE	WEEKLY AVERAGE	MINIMUM	MAXIMUM	FREQUENCY	SAMPLE TYPE
Flow (MGD) [a]	3		NL	NA	NA	NL	Cont.	TI & RE*
PH (S.U.)	1		NA	NA	6.0	9.0	1/Day	Grab
BOD5 (mg/l) [c][d]	1		30	45	NA	NA	3/Week	24 HC
BOD5 (kg/d) [d]	1	15	1703	2555	NA	NA	3/Week	24 HC
TSS (mg/l) [c][d]	1		30	45	NA	NA	3/Week	24 HC
TSS (kg/d) [d]	1	15	1703	2555	NA	NA	3/Week	24 HC
TRC (mg/l) [b][c]	2		0.20	1.3	NA	NA	1/Day	Grab
Total Phosphorus (mg/l) [f]	3		NL	NA	NA	NA	1/Month	24 HC
Total Phosphorus (mg/l) Year to date [f]	3		NL	NA	NA	NA	1/Month	Calc
Total Phosphorus (mg/l) Calendar Year [e][f]	3		0.70	NA	NA	NA	1/Year	Calc
Total Nitrogen (mg/l) [f]	3		NL	NA	NA	NA	1/Month	24 HC
Total Nitrogen (mg/l) Year to date [f]	3		NL	NA	NA	NA	1/Month	Calc
Total Nitrogen (mg/l) Calendar Year [e][f]	3		8.0	NA	NA	NA	1/Year	Calc

PARAMETER & UNITS	BASIS FOR LIMITS	DESIGN FLOW MULTIPLIER	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
			MONTHLY AVERAGE	WEEKLY AVERAGE	MINIMUM	MAXIMUM	FREQUENCY	SAMPLE TYPE
Fecal Coliform (n/cml) [d] [g]	2		200	NA	NA	NA	1/Week (Between 10 am & 4 pm)	Grab
Enterococci (n/cml) [h]	2		35	NA	NA	NA	2/Month (Between 10 am & 4 pm)	Grab

NA = NOT APPLICABLE; NL = NO LIMIT, MONITORING REQUIREMENT ONLY

1 Year= January 1-December 31; reported for each full calendar year

* TI&RE = Totalizing, Indicating, Recording Equipment

Upon issuance of the permit, Discharge Monitoring Reports (DMRs) shall be submitted to the regional office at the frequency required by the permit regardless of whether an actual discharge occurs. In the event that there is no discharge for the monitoring period, then "no discharge" shall be reported on the DMR.

In addition to any Total Nitrogen or Total Phosphorus concentration limits listed above, this facility has Total Nitrogen and Total Phosphorus calendar year load limits associated with this outfall included in the current Registration List under registration number VAN030052, enforceable under the General VPDES Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Watershed in Virginia.

- [a] The design flow of this treatment facility is 15 MGD. See Part I.C.5 for additional flow requirements.
- [b] See Part I.B. for additional chlorine monitoring instructions.
- [c] See Parts I.C.6 and I.C.7 for quantifications regarding effluent monitoring requirements, respectively.
- [d] See Part I.C.8 for additional instructions regarding effluent monitoring frequencies.
- [e] Annual average limitation, based on a calculation of all samples collected during the calendar year.
- [f] See Part I.C.10. for additional instructions regarding Total Phosphorus and Total Nitrogen
- [g] Fecal Coliform monthly average is calculated as a geometric mean.
- [h] Enterococci monthly average is calculated as a geometric mean. Samples must be taken at least 7 days apart.

- 2. There shall be no discharge of floating solids or visible foam in other than trace amounts.
- 3. At least 85% removal for BOD and TSS must be attained for this effluent.

The basis for the limitations codes are:

- 1. Technology (e.g., Federal Effluent Guidelines)
- 2. Water Quality Standards (9 VAC 25-260 et. seq.)
- 3. Best Professional Judgment

TABLE II - MUNICIPAL MINOR EFFLUENT LIMITATIONS

Attachment 5 continued

Final Chlorine Limitations Effective Dates - From: Permit Issuance To: Permit Expiration

TRC **	AFTER CL2 CONTACT TANK (Dechlor. Required)			AFTER DECHLORINATION		AFTER CL2 CONTACT TANK (Dechlor. Not Required)				
	MIN.	EXC.	INST. MIN.	WKLY AVG.	INST. MAX.	PERMIT RANGE	EXC.	REPORT- ING RANGE	EXC.	TECH. MAX.
a) Non-Detect. Dechlor. Required	---	---	---	---	---	NA	NA	NA	NA	NA
b) Detect. Dechlor. Required	0.50 mg/l	36	0.5 mg/l*	1.3 mg/l	---	NA	NA	NA	NA	NA
c) No Dechlor.	NA	NA	NA	NA	NA	---	---	---	---	---

* Reporting is required when 3 or more consecutive readings are <0.5 mg/l or when the TRC is <0.1 mg/l.

** --Chlorine mass balance C_w (W for Tidal systems): check one

___ a) $C_w < 0.1$ mg/l [dechlor. required, non-detectable format]

X b) $0.1 \text{ mg/l} \leq C_w < 2.0 \text{ mg/l}$ (2.5 mg/l for PWS, Shellfish waters) [dechlor. required, detectable format]

___ c) $C_w > 2.0$ mg/l (2.5 mg/l for PWS, Shellfish waters) [dechlor. not required, include a restrictive technology max. value]

The design flow of this treatment facility is 15 MGD.

NA = NOT APPLICABLE; NL = NO LIMIT, MONITORING REQUIREMENT ONLY

See Part I.B. for additional TRC limitations.

TABLE II - STORM WATER EFFLUENT LIMITATIONS/MONITORING

OUTFALLS #002, 003, 005-007

Outfall Description: Stormwater Not Associated With Regulated Industrial Activity
SIC CODE: 4952

THESE OUTFALLS SHALL CONTAIN STORM WATER RUNOFF NOT ASSOCIATED WITH A REGULATED INDUSTRIAL ACTIVITY WHERE NO MONITORING IS REQUIRED. THERE SHALL BE NO DISCHARGE OF PROCESS WASTEWATER FROM THESE OUTFALLS.

No exposure status has been given to these outfalls.

ATTACHMENT 6

EFFLUENT LIMITATIONS/MONITORING
RATIONALE/SUITABLE DATA/
ANTIDEGRADATION/ANTIBACKSLIDING

HRSD York River STP
Rationale For Parameters, Limitations, And Sampling Requirements
Outfall 001

Flow: No limit, monitoring is required with continuous, totalizing, indicating or recording equipment. This based on the VPDES Permit Manual, and is standard for sanitary wastewater plants with discharges greater than 2 MGD. The design flow of 15 MGD is the baseline for the 95% design flow capacity notification.

pH: Minimum limit of 6.0 and maximum of 9.0 S.U. These limits are based on Federal Effluent Guidelines (40 CFR 133.102) and Water Quality Standards in 9 VAC 25-260-50, which limits pH to the range above for coastal waters of the State. Monitoring is a daily grab sample and is standard for sanitary WW plants with discharges greater than 2 MGD.

Biochemical Oxygen Demand: Monthly average of 30 mg/l and 1703 kg/day and a weekly average of 45 mg/l and 2555 kg/day. This is based on Federal Effluent Guidelines (40 CFR 133.102) which sets the limits for secondary WW plants. Loading limits are in whole numbers based upon the latest DEQ significant figures guidance (06-2016). Monitoring required is a 24 hour composite, 3 days a week. The frequency is based upon previous permit reissuances where DEQ guidance document 98-2005 was used to decrease the monitoring frequency to 3 days/week. This will be carried forward for this reissuance.

Total Suspended Solids: Monthly average of 30 mg/l and 1703 kg/day and a weekly average of 45 mg/l and 2555 kg/day. This is based on Federal Effluent Guidelines (40 CFR 133.102) which sets the limits for secondary WW plants. Loading limits are in whole numbers based upon the latest DEQ significant figures guidance (06-2016). Monitoring required is a 24 hour composite, 3 days a week. The frequency is based upon previous permit reissuances where DEQ guidance document 98-2005 was used to decrease the monitoring frequency to 3 days/week. This will be carried forward for this reissuance.

Total Residual Contact Chlorine: Minimum limit after contact time is 0.50 mg/l with 36 exceptions. This value was determined from the HRSD Chlorine Reduction Test which was approved by DEQ in February 1997. In addition, it follows the requirements of the VPDES permit manual. These process monitoring limits are believed necessary to ensure proper disinfection. Monitoring required is a grab sample once every two hours. This is based on the VPDES Permit Manual and is standard for municipal discharges of > 2.0 MGD to nutrient enriched waters.
A special condition requires reporting if the chlorine concentration falls below 0.5 mg/l or chlorination is lost(<0.01 mg/l).

Final Total Residual Chlorine: A weekly average of 1.3 mg/l. A monthly average of 0.20 mg/l. This is a technology based limit following guidance document 00-2011 and is carried forward from the current permit. Monitoring is required once/day by grab sample. The frequency is based on the VPDES permit manual and is standard for municipal discharges of >2.0 MGD.

Fecal Coliform: Monthly average of 200 n/cml. This is based on Water Quality Standards (9 VAC 25-260-160) and is believed protective of instream standards. Monitoring required is a grab sample once a week. The VPDES Manual allows reduction to this frequency based on long term average discharge values in relation to the monthly average limit. Current guidance requires fecal coliform monitoring in salt or transition waters if the discharge is to shellfish waters. BPJ determines that this frequency is adequate to determine compliance with the standard.

Enterococci: A monthly average limit of 35 n/cml is included per water quality standards. Sampling is required 2/Month to be calculated as a geometric mean. Samples must be taken at least 7 days apart. This is carried forward from the current permit. Enterococci was added at the time the last permit modification due to Enterococci monitoring becoming an issue that EPA addressed in late 2007/early 2008.

Total Phosphorus Calendar Year An annual average concentration limit of 0.70 mg/l is placed in the permit with monitoring on an annual basis. Additional nutrient monitoring and reporting is covered under the General VPDES Watershed Permit for Total Nitrogen and Total Phosphorus. The York River HRSD facility is covered under VAN030052. On 5/16/07 guidance document 07-2008 was released by DEQ Central Office for the implementation of the nutrient general permit in relation to the individual permit. The CTO for this facility was issued 10/13/11 and the TP limit of 0.70 mg/l became effective. The limit is carried forward to the reissued permit.

Total Phosphorus Year-to-Date There is no limit for the monthly average TP Year-to-date parameter. This parameter was added to the permit in accordance with guidance document 07-2008. Reporting is 1/M and is a calculation. Data for this parameter is collected in accordance with the VPDES permit VAN030052 for the York River Watershed held by HRSD.

Total Phosphorus There is no limit for the monthly average phosphorus parameter. This parameter was added to the permit in accordance with guidance document 07-2008. Reporting is 1/M. Data for this parameter is collected in accordance with the VPDES permit VAN030052 for the York River Watershed. Reporting for this parameter is required in the individual permit (IP) because the annual concentration limits is contained in the IP. All data used to calculate and determine compliance with the limit in the IP needs to be in the same document and reported on the same form as the limit.

Total Nitrogen Calendar Year A limit of 8.0 mg/l for Total Nitrogen is a final limit. Part I Section C.4 of the permit states that upon issuance of a CTC, DEQ staff shall initiate modification of this permit to

include annual concentrations limits based on the nutrient removal technologies listed in the CTC. The CTC for this facility was issued on 5/12/08 by DEQ office of wastewater engineering staff. The permit was modified to include the TN limit. The CTO for nutrient upgrades was issued on 10/13/11 and the limit became effective. The limit of 8.0 mg/l is in accordance with the significant figure guidance document 06-2016.

**Total
Nitrogen
Year-to-Date**

There is no limit for the monthly average TN Year-to-date parameter. This parameter was added to the permit in accordance with guidance document 07-2008. Reporting is 1/M and is a calculation. Data for this parameter is collected in accordance with the VPDES permit VAN030052 for the York River Watershed held by HRSD.

**Total
Nitrogen**

There will be no limit for the monthly average nitrogen. This parameter is added to the modified permit as a final limit and reporting will become effective upon the issuance date of the CTO for the nutrient removal facilities. This parameter was added to the permit in accordance with guidance document 07-2008. Reporting will be 1/M. Data for this parameter is collected in accordance with the VPDES permit VAN030052 for the York River Watershed. Reporting for this parameter is required in the individual permit (IP) because the annual concentration limits is contained in the IP. All data used to calculate and determine compliance with the limit in the IP needs to be in the same document and reported on the same form as the limit.

Water Quality Standards Reasonable Potential

Nickel, Zinc, and Ammonia all had a quantifiable concentration for the data gathered for the 2015 application. However, these data points were significantly below the most limiting wasteload allocations found in the attached wasteload allocation analysis with the application. No limits were needed for these parameters.

All other water quality parameters reported on Form 2A were below the quantification levels. No additional limits are needed at this time.

Mixing Zone Analysis

In response to the Dominion Power plan to shut down the Yorktown Power Plant, HRSD has chosen to move the discharge location to the York River. Because of that, a new mixing zone analysis was needed for the proposed pipe location in the York River. The analysis was submitted to DEQ CO in May 2015 with additional comments and drafts and a final submittal on December 1, 2015. CO agreed to the mixing numbers presented in the 12/1/15 submittal that gives the facility a mix of 29.8:1 for acute dilution and 114.6:1 for chronic dilution. All documentation is attached. These dilutions will be used once the discharge pipe is constructed.

Stormwater

Outfalls 002, 003, 005-007 are discharges of stormwater from the plant (industrial) area. HRSD has met the requirements for industrial "no exposure", thereby only discharging stormwater not associated with an industrial activity. The Stormwater Management Condition has been removed from the permit. The "no exposure" certification form is attached to the section.

It is noted that the bacteria values presented in the stormwater data are elevated. The facility offers the following explanation.

The CEL has confirmed the analytical results for Bacteria Samples from YR Stormwater 9/9/14. The reported results are correct.

The plant manager at YR, Andy Nelson, had the following explanation for the increase in microbial activity in the stormwater samples:

- Prior to September 2014 we had an abundance of geese that not only inhabited our plant site but also mated and bore offspring on an annual basis.
- The downside was mess they made on sidewalks and frequently traveled pathways for plant personnel.
- The storm water location we sampled also happens to be a preferred location for gosling swim lessons due to the ease of access and proximity of shallow and deep water pools.
- Based on our records, we received our first coyote decoy in September 2014 to try and the discourage the geese population. Several of other HRSD facilities had employed decoys with a wide range of success.
- We now have six decoys located at several locations throughout the site and the results have been amazing.

Based on Andy's explanation, we sampled for stormwater during the peak of the plant geese population, explaining our very high bacterial values. Since that time, we have deployed decoys to significantly reduce the geese population on the plant site.

This is an excerpt from an email from Lauren Grimmer (HRSD-Technical Services Division). The email is attached to this section.

Permit No	Parameter Description	QTYAVG	QTYMAX	CONCMIN	CONCAVG	CONCMAX	Date	Date
VA0081311	FLOW	15.69	21.96				1-Feb-13	28-Feb-13
VA0081311	pH			6.6		7.3	1-Feb-13	28-Feb-13
VA0081311	BOD5	350	356		6	6	1-Feb-13	28-Feb-13
VA0081311	TSS	73	96		1.3	1.8	1-Feb-13	28-Feb-13
VA0081311	COLIFORM, FECAL				1		1-Feb-13	28-Feb-13
VA0081311	TP				0.45		1-Feb-13	28-Feb-13
VA0081311	TN				7.3		1-Feb-13	28-Feb-13
VA0081311	ENTEROCOCCI				1		1-Feb-13	28-Feb-13
VA0081311	CL2, TOTAL CONTACT			0.29			1-Feb-13	28-Feb-13
VA0081311	CL2, TOTAL FINAL				0.028	0.033	1-Feb-13	28-Feb-13
VA0081311	TN Year to Date				7.0		1-Feb-13	28-Feb-13
VA0081311	TP Year to Date				0.39		1-Feb-13	28-Feb-13
VA0081311	FLOW	15.13	18.66				1-Mar-13	31-Mar-13
VA0081311	pH			6.4		7.5	1-Mar-13	31-Mar-13
VA0081311	BOD5	268	423		5	7	1-Mar-13	31-Mar-13
VA0081311	TSS	104	142		1.8	2.2	1-Mar-13	31-Mar-13
VA0081311	COLIFORM, FECAL				1		1-Mar-13	31-Mar-13
VA0081311	TP				0.52		1-Mar-13	31-Mar-13
VA0081311	TN				4.7		1-Mar-13	31-Mar-13
VA0081311	ENTEROCOCCI				1		1-Mar-13	31-Mar-13
VA0081311	CL2, TOTAL CONTACT			0.32			1-Mar-13	31-Mar-13
VA0081311	CL2, TOTAL FINAL				0.035	0.13	1-Mar-13	31-Mar-13
VA0081311	TN Year to Date				6.3		1-Mar-13	31-Mar-13
VA0081311	TP Year to Date				0.43		1-Mar-13	31-Mar-13
VA0081311	FLOW	13.38	16.39				1-Apr-13	30-Apr-13
VA0081311	pH			6.7		7.5	1-Apr-13	30-Apr-13
VA0081311	BOD5	168	173		3	4	1-Apr-13	30-Apr-13
VA0081311	TSS	126	119		2.4	2.2	1-Apr-13	30-Apr-13
VA0081311	COLIFORM, FECAL				1		1-Apr-13	30-Apr-13
VA0081311	TP				0.64		1-Apr-13	30-Apr-13
VA0081311	TN				4.5		1-Apr-13	30-Apr-13
VA0081311	ENTEROCOCCI				2		1-Apr-13	30-Apr-13
VA0081311	CL2, TOTAL CONTACT			0.27			1-Apr-13	30-Apr-13
VA0081311	CL2, TOTAL FINAL				0.017	0.074	1-Apr-13	30-Apr-13
VA0081311	TN Year to Date				5.8		1-Apr-13	30-Apr-13
VA0081311	TP Year to Date				0.49		1-Apr-13	30-Apr-13
VA0081311	FLOW	13.20	14.62				1-May-13	31-May-13
VA0081311	pH			6.7		7.5	1-May-13	31-May-13
VA0081311	BOD5	227	287		5	6	1-May-13	31-May-13
VA0081311	TSS	150	212		3.0	4.4	1-May-13	31-May-13
VA0081311	COLIFORM, FECAL				1		1-May-13	31-May-13
VA0081311	TP				0.62		1-May-13	31-May-13
VA0081311	TN				6.2		1-May-13	31-May-13
VA0081311	ENTEROCOCCI				2		1-May-13	31-May-13
VA0081311	CL2, TOTAL CONTACT			0.23			1-May-13	31-May-13
VA0081311	CL2, TOTAL FINAL				0.043	0.10	1-May-13	31-May-13
VA0081311	TN Year to Date				5.9		1-May-13	31-May-13
VA0081311	TP Year to Date				0.51		1-May-13	31-May-13
VA0081311	FLOW	12.65	15.67				1-Jun-13	30-Jun-13
VA0081311	pH			7.1		7.5	1-Jun-13	30-Jun-13
VA0081311	BOD5	69	120		1	3	1-Jun-13	30-Jun-13
VA0081311	TSS	82	114		1.7	2.5	1-Jun-13	30-Jun-13
VA0081311	COLIFORM, FECAL				4		1-Jun-13	30-Jun-13
VA0081311	TP				0.47		1-Jun-13	30-Jun-13
VA0081311	TN				4.7		1-Jun-13	30-Jun-13
VA0081311	ENTEROCOCCI				4		1-Jun-13	30-Jun-13
VA0081311	CL2, TOTAL CONTACT			0.14			1-Jun-13	30-Jun-13
VA0081311	CL2, TOTAL FINAL				0.0033	0.0143	1-Jun-13	30-Jun-13
VA0081311	TN Year to Date				5.7		1-Jun-13	30-Jun-13
VA0081311	TP Year to Date				0.51		1-Jun-13	30-Jun-13
VA0081311	FLOW	11.62	16.68				1-Jul-13	31-Jul-13
VA0081311	pH			6.6		7.4	1-Jul-13	31-Jul-13
VA0081311	BOD5	15	58		0	1	1-Jul-13	31-Jul-13

VA0081311	TSS	56	73		1.3	1.6	1-Jul-13	31-Jul-13
VA0081311	COLIFORM, FECAL				1		1-Jul-13	31-Jul-13
VA0081311	TP				0.54		1-Jul-13	31-Jul-13
VA0081311	TN				5.4		1-Jul-13	31-Jul-13
VA0081311	ENTEROCOCCI				1		1-Jul-13	31-Jul-13
VA0081311	CL2, TOTAL CONTACT			0.13			1-Jul-13	31-Jul-13
VA0081311	CL2, TOTAL FINAL				<QL	<QL	1-Jul-13	31-Jul-13
VA0081311	TN Year to Date				5.7		1-Jul-13	31-Jul-13
VA0081311	TP Year to Date				0.51		1-Jul-13	31-Jul-13
VA0081311	FLOW	12.90	14.83				1-Aug-13	31-Aug-13
VA0081311	pH			7.0		7.4	1-Aug-13	31-Aug-13
VA0081311	BOD5	92	173		2	3	1-Aug-13	31-Aug-13
VA0081311	TSS	49	82		1.0	1.6	1-Aug-13	31-Aug-13
VA0081311	COLIFORM, FECAL				1		1-Aug-13	31-Aug-13
VA0081311	TP				0.54		1-Aug-13	31-Aug-13
VA0081311	TN				6.1		1-Aug-13	31-Aug-13
VA0081311	ENTEROCOCCI				1		1-Aug-13	31-Aug-13
VA0081311	CL2, TOTAL CONTACT			0.22			1-Aug-13	31-Aug-13
VA0081311	CL2, TOTAL FINAL				<QL	<QL	1-Aug-13	31-Aug-13
VA0081311	TN Year to Date				5.7		1-Aug-13	31-Aug-13
VA0081311	TP Year to Date				0.51		1-Aug-13	31-Aug-13
VA0081311	FLOW	10.64	11.85				1-Sep-13	30-Sep-13
VA0081311	pH			7.1		7.4	1-Sep-13	30-Sep-13
VA0081311	BOD5	134	215		3	5	1-Sep-13	30-Sep-13
VA0081311	TSS	88	140		2.2	3.5	1-Sep-13	30-Sep-13
VA0081311	COLIFORM, FECAL				1		1-Sep-13	30-Sep-13
VA0081311	TP				0.55		1-Sep-13	30-Sep-13
VA0081311	TN				5.3		1-Sep-13	30-Sep-13
VA0081311	ENTEROCOCCI				1		1-Sep-13	30-Sep-13
VA0081311	CL2, TOTAL CONTACT			0.43			1-Sep-13	30-Sep-13
VA0081311	CL2, TOTAL FINAL				0.0050	0.021	1-Sep-13	30-Sep-13
VA0081311	TN Year to Date				5.7		1-Sep-13	30-Sep-13
VA0081311	TP Year to Date				0.52		1-Sep-13	30-Sep-13
VA0081311	FLOW	11.77	18.81				1-Oct-13	31-Oct-13
VA0081311	pH			7.0		7.3	1-Oct-13	31-Oct-13
VA0081311	BOD5	117	116		3	3	1-Oct-13	31-Oct-13
VA0081311	TSS	64	89		1.5	1.8	1-Oct-13	31-Oct-13
VA0081311	COLIFORM, FECAL				1		1-Oct-13	31-Oct-13
VA0081311	TP				0.86		1-Oct-13	31-Oct-13
VA0081311	TN				6.0		1-Oct-13	31-Oct-13
VA0081311	ENTEROCOCCI				1		1-Oct-13	31-Oct-13
VA0081311	CL2, TOTAL CONTACT			0.23			1-Oct-13	31-Oct-13
VA0081311	CL2, TOTAL FINAL				0.0048	0.021	1-Oct-13	31-Oct-13
VA0081311	TN Year to Date				5.7		1-Oct-13	31-Oct-13
VA0081311	TP Year to Date				0.55		1-Oct-13	31-Oct-13
VA0081311	FLOW	10.88	14.39				1-Nov-13	30-Nov-13
VA0081311	pH			6.5		7.2	1-Nov-13	30-Nov-13
VA0081311	BOD5	169	270		4	6	1-Nov-13	30-Nov-13
VA0081311	TSS	33	50		0.81	1.3	1-Nov-13	30-Nov-13
VA0081311	COLIFORM, FECAL				1		1-Nov-13	30-Nov-13
VA0081311	TP				0.86		1-Nov-13	30-Nov-13
VA0081311	TN				7.4		1-Nov-13	30-Nov-13
VA0081311	ENTEROCOCCI				1		1-Nov-13	30-Nov-13
VA0081311	CL2, TOTAL CONTACT			0.34			1-Nov-13	30-Nov-13
VA0081311	CL2, TOTAL FINAL				<QL	<QL	1-Nov-13	30-Nov-13
VA0081311	TN Year to Date				5.9		1-Nov-13	30-Nov-13
VA0081311	TP Year to Date				0.58		1-Nov-13	30-Nov-13
VA0081311	FLOW	14.65	18.48				1-Dec-13	31-Dec-13
VA0081311	pH			6.9		7.3	1-Dec-13	31-Dec-13
VA0081311	BOD5	271	419		5	8	1-Dec-13	31-Dec-13
VA0081311	TSS	45	124		0.93	2.9	1-Dec-13	31-Dec-13
VA0081311	COLIFORM, FECAL				1		1-Dec-13	31-Dec-13
VA0081311	TP				0.60		1-Dec-13	31-Dec-13
VA0081311	TN				6.8		1-Dec-13	31-Dec-13

VA0081311	ENTEROCOCCI			1		1-Dec-13	31-Dec-13
VA0081311	CL2, TOTAL CONTACT		0.24			1-Dec-13	31-Dec-13
VA0081311	CL2, TOTAL FINAL			0.035	0.11	1-Dec-13	31-Dec-13
VA0081311	TN Year to Date			5.9		1-Dec-13	31-Dec-13
VA0081311	TP Year to Date			0.58		1-Dec-13	31-Dec-13
VA0081311	FLOW	15.04	18.78			1-Jan-14	31-Jan-14
VA0081311	pH		7.0		7.3	1-Jan-14	31-Jan-14
VA0081311	BOD5	150	240	3	4	1-Jan-14	31-Jan-14
VA0081311	TSS	3	15	0.055	0.24	1-Jan-14	31-Jan-14
VA0081311	COLIFORM, FECAL			1		1-Jan-14	31-Jan-14
VA0081311	TP			0.38		1-Jan-14	31-Jan-14
VA0081311	TN			5.8		1-Jan-14	31-Jan-14
VA0081311	ENTEROCOCCI			1		1-Jan-14	31-Jan-14
VA0081311	CL2, TOTAL CONTACT		0.24			1-Jan-14	31-Jan-14
VA0081311	CL2, TOTAL FINAL			<QL	<QL	1-Jan-14	31-Jan-14
VA0081311	TN Year to Date			5.8		1-Jan-14	31-Jan-14
VA0081311	TP Year to Date			0.38		1-Jan-14	31-Jan-14
VA0081311	FLOW	15.30	19.28			1-Feb-14	28-Feb-14
VA0081311	pH		6.9		7.3	1-Feb-14	28-Feb-14
VA0081311	BOD5	303	366	5	6	1-Feb-14	28-Feb-14
VA0081311	TSS	50	69	0.87	1.2	1-Feb-14	28-Feb-14
VA0081311	COLIFORM, FECAL			1		1-Feb-14	28-Feb-14
VA0081311	TP			0.74		1-Feb-14	28-Feb-14
VA0081311	TN			7.7		1-Feb-14	28-Feb-14
VA0081311	ENTEROCOCCI			1		1-Feb-14	28-Feb-14
VA0081311	CL2, TOTAL CONTACT		0.49			1-Feb-14	28-Feb-14
VA0081311	CL2, TOTAL FINAL			0.048	0.12	1-Feb-14	28-Feb-14
VA0081311	TN Year to Date			6.8		1-Feb-14	28-Feb-14
VA0081311	TP Year to Date			0.56		1-Feb-14	28-Feb-14
VA0081311	FLOW	15.00	19.75			1-Mar-14	31-Mar-14
VA0081311	pH		7.0		7.4	1-Mar-14	31-Mar-14
VA0081311	BOD5	448	589	8	10	1-Mar-14	31-Mar-14
VA0081311	TSS	51	121	0.92	2.3	1-Mar-14	31-Mar-14
VA0081311	COLIFORM, FECAL			1		1-Mar-14	31-Mar-14
VA0081311	TP			0.75		1-Mar-14	31-Mar-14
VA0081311	TN			6.3		1-Mar-14	31-Mar-14
VA0081311	ENTEROCOCCI			3		1-Mar-14	31-Mar-14
VA0081311	CL2, TOTAL CONTACT		0.28			1-Mar-14	31-Mar-14
VA0081311	CL2, TOTAL FINAL			0.015	0.043	1-Mar-14	31-Mar-14
VA0081311	TN Year to Date			6.6		1-Mar-14	31-Mar-14
VA0081311	TP Year to Date			0.62		1-Mar-14	31-Mar-14
VA0081311	FLOW	15.48	19.91			1-Apr-14	30-Apr-14
VA0081311	pH		6.9		7.5	1-Apr-14	30-Apr-14
VA0081311	BOD5	270	386	5	7	1-Apr-14	30-Apr-14
VA0081311	TSS	74	65	1.3	1.1	1-Apr-14	30-Apr-14
VA0081311	COLIFORM, FECAL			2		1-Apr-14	30-Apr-14
VA0081311	TP			0.34		1-Apr-14	30-Apr-14
VA0081311	TN			5.4		1-Apr-14	30-Apr-14
VA0081311	ENTEROCOCCI			1		1-Apr-14	30-Apr-14
VA0081311	CL2, TOTAL CONTACT		0.23			1-Apr-14	30-Apr-14
VA0081311	CL2, TOTAL FINAL			0.097	0.15	1-Apr-14	30-Apr-14
VA0081311	TN Year to Date			6.3		1-Apr-14	30-Apr-14
VA0081311	TP Year to Date			0.55		1-Apr-14	30-Apr-14
VA0081311	FLOW	13.22	16.85			1-May-14	31-May-14
VA0081311	pH		7.2		7.5	1-May-14	31-May-14
VA0081311	BOD5	229	291	5	6	1-May-14	31-May-14
VA0081311	TSS	116	121	2.3	2.6	1-May-14	31-May-14
VA0081311	COLIFORM, FECAL			2		1-May-14	31-May-14
VA0081311	TP			0.71		1-May-14	31-May-14
VA0081311	TN			2.3		1-May-14	31-May-14
VA0081311	ENTEROCOCCI			2		1-May-14	31-May-14
VA0081311	CL2, TOTAL CONTACT		0.25			1-May-14	31-May-14
VA0081311	CL2, TOTAL FINAL			0.0090	0.0400	1-May-14	31-May-14
VA0081311	TN Year to Date			5.5		1-May-14	31-May-14

VA0081311	TP Year to Date				0.59		1-May-14	31-May-14
VA0081311	FLOW	11.47	13.02				1-Jun-14	30-Jun-14
VA0081311	pH			7.2		7.6	1-Jun-14	30-Jun-14
VA0081311	BOD5	100	123		2	3	1-Jun-14	30-Jun-14
VA0081311	TSS	76	83		1.8	1.8	1-Jun-14	30-Jun-14
VA0081311	COLIFORM, FECAL				1		1-Jun-14	30-Jun-14
VA0081311	TP				0.80		1-Jun-14	30-Jun-14
VA0081311	TN				3.2		1-Jun-14	30-Jun-14
VA0081311	ENTEROCOCCI				1		1-Jun-14	30-Jun-14
VA0081311	CL2, TOTAL CONTACT			0.33			1-Jun-14	30-Jun-14
VA0081311	CL2, TOTAL FINAL				0.024	0.083	1-Jun-14	30-Jun-14
VA0081311	TN Year to Date				5.1		1-Jun-14	30-Jun-14
VA0081311	TP Year to Date				0.62		1-Jun-14	30-Jun-14
VA0081311	FLOW	10.65	11.83				1-Jul-14	31-Jul-14
VA0081311	pH			7.0		7.4	1-Jul-14	31-Jul-14
VA0081311	BOD5	95	118		2	3	1-Jul-14	31-Jul-14
VA0081311	TSS	71	88		1.8	2.3	1-Jul-14	31-Jul-14
VA0081311	COLIFORM, FECAL				2		1-Jul-14	31-Jul-14
VA0081311	TP				0.35		1-Jul-14	31-Jul-14
VA0081311	TN				4.2		1-Jul-14	31-Jul-14
VA0081311	ENTEROCOCCI				2		1-Jul-14	31-Jul-14
VA0081311	CL2, TOTAL CONTACT			0.23			1-Jul-14	31-Jul-14
VA0081311	CL2, TOTAL FINAL				0.052	<QL	1-Jul-14	31-Jul-14
VA0081311	TN Year to Date				5.0		1-Jul-14	31-Jul-14
VA0081311	TP Year to Date				0.58		1-Jul-14	31-Jul-14
VA0081311	FLOW	10.57	12.46				1-Aug-14	31-Aug-14
VA0081311	pH			6.8		7.4	1-Aug-14	31-Aug-14
VA0081311	BOD5	138	315		3	8	1-Aug-14	31-Aug-14
VA0081311	TSS	54	60		1.3	1.6	1-Aug-14	31-Aug-14
VA0081311	COLIFORM, FECAL				1		1-Aug-14	31-Aug-14
VA0081311	TP				0.22		1-Aug-14	31-Aug-14
VA0081311	TN				4.6		1-Aug-14	31-Aug-14
VA0081311	ENTEROCOCCI				5		1-Aug-14	31-Aug-14
VA0081311	CL2, TOTAL CONTACT			0.23			1-Aug-14	31-Aug-14
VA0081311	CL2, TOTAL FINAL				<QL	<QL	1-Aug-14	31-Aug-14
VA0081311	TN Year to Date				4.9		1-Aug-14	31-Aug-14
VA0081311	TP Year to Date				0.54		1-Aug-14	31-Aug-14
VA0081311	FLOW	12.37	20.18				1-Sep-14	30-Sep-14
VA0081311	pH			6.9		7.3	1-Sep-14	30-Sep-14
VA0081311	BOD5	30	41		1	1	1-Sep-14	30-Sep-14
VA0081311	TSS	14	36		0.34	0.80	1-Sep-14	30-Sep-14
VA0081311	COLIFORM, FECAL				7		1-Sep-14	30-Sep-14
VA0081311	TP				0.27		1-Sep-14	30-Sep-14
VA0081311	TN				6.9		1-Sep-14	30-Sep-14
VA0081311	ENTEROCOCCI				4		1-Sep-14	30-Sep-14
VA0081311	CL2, TOTAL CONTACT			0.15			1-Sep-14	30-Sep-14
VA0081311	CL2, TOTAL FINAL				0.050	0.17	1-Sep-14	30-Sep-14
VA0081311	TN Year to Date				5.2		1-Sep-14	30-Sep-14
VA0081311	TP Year to Date				0.51		1-Sep-14	30-Sep-14
VA0081311	FLOW	10.94	12.21				1-Oct-14	31-Oct-14
VA0081311	pH			7.0		7.3	1-Oct-14	31-Oct-14
VA0081311	BOD5	97	168		2	4	1-Oct-14	31-Oct-14
VA0081311	TSS	42	76		1.0	1.9	1-Oct-14	31-Oct-14
VA0081311	COLIFORM, FECAL				8		1-Oct-14	31-Oct-14
VA0081311	TP				0.66		1-Oct-14	31-Oct-14
VA0081311	TN				5.9		1-Oct-14	31-Oct-14
VA0081311	ENTEROCOCCI				6		1-Oct-14	31-Oct-14
VA0081311	CL2, TOTAL CONTACT			0.21			1-Oct-14	31-Oct-14
VA0081311	CL2, TOTAL FINAL				0.064	0.17	1-Oct-14	31-Oct-14
VA0081311	TN Year to Date				5.2		1-Oct-14	31-Oct-14
VA0081311	TP Year to Date				0.52		1-Oct-14	31-Oct-14
VA0081311	FLOW	11.01	16.10				1-Nov-14	30-Nov-14
VA0081311	pH			7.0		7.2	1-Nov-14	30-Nov-14
VA0081311	BOD5	110	133		3	3	1-Nov-14	30-Nov-14

VA0081311	TSS	23	55		0.54	1.4	1-Nov-14	30-Nov-14
VA0081311	COLIFORM, FECAL				1		1-Nov-14	30-Nov-14
VA0081311	TP				1.0		1-Nov-14	30-Nov-14
VA0081311	TN				7.6		1-Nov-14	30-Nov-14
VA0081311	ENTEROCOCCI				1		1-Nov-14	30-Nov-14
VA0081311	CL2, TOTAL CONTACT			0.13			1-Nov-14	30-Nov-14
VA0081311	CL2, TOTAL FINAL				<QL	<QL	1-Nov-14	30-Nov-14
VA0081311	TN Year to Date				5.5		1-Nov-14	30-Nov-14
VA0081311	TP Year to Date				0.57		1-Nov-14	30-Nov-14
VA0081311	FLOW	12.82	19.33				1-Dec-14	31-Dec-14
VA0081311	pH			7.0		7.3	1-Dec-14	31-Dec-14
VA0081311	BOD5	128	213		3	5	1-Dec-14	31-Dec-14
VA0081311	TSS	64	116		1.3	2.7	1-Dec-14	31-Dec-14
VA0081311	COLIFORM, FECAL				1		1-Dec-14	31-Dec-14
VA0081311	TP				0.83		1-Dec-14	31-Dec-14
VA0081311	TN				7.6		1-Dec-14	31-Dec-14
VA0081311	ENTEROCOCCI				1		1-Dec-14	31-Dec-14
VA0081311	CL2, TOTAL CONTACT			0.35			1-Dec-14	31-Dec-14
VA0081311	CL2, TOTAL FINAL				<QL	<QL	1-Dec-14	31-Dec-14
VA0081311	TN Annual Avg				5.6		1-Jan-14	31-Dec-14
VA0081311	TN Year to Date				5.6		1-Dec-14	31-Dec-14
VA0081311	TP Year to Date				0.59		1-Dec-14	31-Dec-14
VA0081311	TP Annual Avg				0.59		1-Jan-14	31-Dec-14
VA0081311	FLOW	14.71	19.22				1-Jan-15	31-Jan-15
VA0081311	pH			6.9		7.3	1-Jan-15	31-Jan-15
VA0081311	BOD5	228	453		4	9	1-Jan-15	31-Jan-15
VA0081311	TSS	103	229		2.0	4.7	1-Jan-15	31-Jan-15
VA0081311	COLIFORM, FECAL				1		1-Jan-15	31-Jan-15
VA0081311	TP				0.28		1-Jan-15	31-Jan-15
VA0081311	TN				6.7		1-Jan-15	31-Jan-15
VA0081311	ENTEROCOCCI				1		1-Jan-15	31-Jan-15
VA0081311	CL2, TOTAL CONTACT			0.22			1-Jan-15	31-Jan-15
VA0081311	CL2, TOTAL FINAL				0.037	0.17	1-Jan-15	31-Jan-15
VA0081311	TN Year to Date				6.7		1-Jan-15	31-Jan-15
VA0081311	TP Year to Date				0.28		1-Jan-15	31-Jan-15
VA0081311	FLOW	13.54	15.59				1-Feb-15	28-Feb-15
VA0081311	pH			7.0		7.3	1-Feb-15	28-Feb-15
VA0081311	BOD5	294	387		6	8	1-Feb-15	28-Feb-15
VA0081311	TSS	18	23		0.35	0.46	1-Feb-15	28-Feb-15
VA0081311	COLIFORM, FECAL				1		1-Feb-15	28-Feb-15
VA0081311	TP				0.28		1-Feb-15	28-Feb-15
VA0081311	TN				5.8		1-Feb-15	28-Feb-15
VA0081311	ENTEROCOCCI				2		1-Feb-15	28-Feb-15
VA0081311	CL2, TOTAL CONTACT			0.29			1-Feb-15	28-Feb-15
VA0081311	CL2, TOTAL FINAL				0.071	0.26	1-Feb-15	28-Feb-15
VA0081311	TN Year to Date				6.3		1-Feb-15	28-Feb-15
VA0081311	TP Year to Date				0.28		1-Feb-15	28-Feb-15
VA0081311	FLOW	16.46	21.31				1-Mar-15	31-Mar-15
VA0081311	pH			7.0		7.4	1-Mar-15	31-Mar-15
VA0081311	BOD5	214	291		4	5	1-Mar-15	31-Mar-15
VA0081311	TSS	64	95		1.1	1.7	1-Mar-15	31-Mar-15
VA0081311	COLIFORM, FECAL				1		1-Mar-15	31-Mar-15
VA0081311	TP				0.44		1-Mar-15	31-Mar-15
VA0081311	TN				5.3		1-Mar-15	31-Mar-15
VA0081311	ENTEROCOCCI				2		1-Mar-15	31-Mar-15
VA0081311	CL2, TOTAL CONTACT			0.33			1-Mar-15	31-Mar-15
VA0081311	CL2, TOTAL FINAL				0.024	0.11	1-Mar-15	31-Mar-15
VA0081311	TN Year to Date				5.9		1-Mar-15	31-Mar-15
VA0081311	TP Year to Date				0.33		1-Mar-15	31-Mar-15
VA0081311	FLOW	13.51	19.60				1-Apr-15	30-Apr-15
VA0081311	pH			7.1		7.4	1-Apr-15	30-Apr-15
VA0081311	BOD5	265	321		5	7	1-Apr-15	30-Apr-15
VA0081311	TSS	177	308		3.4	6.7	1-Apr-15	30-Apr-15
VA0081311	COLIFORM, FECAL				3		1-Apr-15	30-Apr-15

VA0081311	TP				0.64		1-Apr-15	30-Apr-15
VA0081311	TN				5.7		1-Apr-15	30-Apr-15
VA0081311	ENTEROCOCCI				2		1-Apr-15	30-Apr-15
VA0081311	CL2, TOTAL CONTACT			0.31			1-Apr-15	30-Apr-15
VA0081311	CL2, TOTAL FINAL				0.099	0.15	1-Apr-15	30-Apr-15
VA0081311	TN Year to Date				5.9		1-Apr-15	30-Apr-15
VA0081311	TP Year to Date				0.41		1-Apr-15	30-Apr-15
VA0081311	FLOW	12.01	13.95				1-May-15	31-May-15
VA0081311	pH			7.1		7.3	1-May-15	31-May-15
VA0081311	BOD5	203	229		4	5	1-May-15	31-May-15
VA0081311	TSS	177	279		3.9	5.6	1-May-15	31-May-15
VA0081311	COLIFORM, FECAL				1		1-May-15	31-May-15
VA0081311	TP				0.53		1-May-15	31-May-15
VA0081311	TN				6.1		1-May-15	31-May-15
VA0081311	ENTEROCOCCI				1		1-May-15	31-May-15
VA0081311	CL2, TOTAL CONTACT			0.34			1-May-15	31-May-15
VA0081311	CL2, TOTAL FINAL				<QL	<QL	1-May-15	31-May-15
VA0081311	TN Year to Date				5.9		1-May-15	31-May-15
VA0081311	TP Year to Date				0.43		1-May-15	31-May-15
VA0081311	FLOW	12.21	14.89				1-Jun-15	30-Jun-15
VA0081311	pH			7.0		7.4	1-Jun-15	30-Jun-15
VA0081311	BOD5	122	68		3	2	1-Jun-15	30-Jun-15
VA0081311	TSS	107	85		2.3	2.0	1-Jun-15	30-Jun-15
VA0081311	COLIFORM, FECAL				4		1-Jun-15	30-Jun-15
VA0081311	TP				0.80		1-Jun-15	30-Jun-15
VA0081311	TN				5.2		1-Jun-15	30-Jun-15
VA0081311	ENTEROCOCCI				3		1-Jun-15	30-Jun-15
VA0081311	CL2, TOTAL CONTACT			0.00			1-Jun-15	30-Jun-15
VA0081311	CL2, TOTAL FINAL				0.0037	<QL	1-Jun-15	30-Jun-15
VA0081311	TN Year to Date				5.8		1-Jun-15	30-Jun-15
VA0081311	TP Year to Date				0.50		1-Jun-15	30-Jun-15
VA0081311	FLOW	12.06	15.54				1-Jul-15	31-Jul-15
VA0081311	pH			7.0		7.4	1-Jul-15	31-Jul-15
VA0081311	BOD5	99	155		2	3	1-Jul-15	31-Jul-15
VA0081311	TSS	72	116		1.6	2.5	1-Jul-15	31-Jul-15
VA0081311	COLIFORM, FECAL				1		1-Jul-15	31-Jul-15
VA0081311	TP				0.83		1-Jul-15	31-Jul-15
VA0081311	TN				4.2		1-Jul-15	31-Jul-15
VA0081311	ENTEROCOCCI				4		1-Jul-15	31-Jul-15
VA0081311	CL2, TOTAL CONTACT			0.23			1-Jul-15	31-Jul-15
VA0081311	CL2, TOTAL FINAL				0.0364	0.1178	1-Jul-15	31-Jul-15
VA0081311	TN Year to Date				5.6		1-Jul-15	31-Jul-15
VA0081311	TP Year to Date				0.54		1-Jul-15	31-Jul-15
VA0081311	FLOW	10.16	10.60				1-Aug-15	31-Aug-15
VA0081311	pH			6.9		7.4	1-Aug-15	31-Aug-15
VA0081311	BOD5	74	164		2	4	1-Aug-15	31-Aug-15
VA0081311	TSS	41	71		1.1	1.9	1-Aug-15	31-Aug-15
VA0081311	COLIFORM, FECAL				1		1-Aug-15	31-Aug-15
VA0081311	TP				0.84		1-Aug-15	31-Aug-15
VA0081311	TN				4.9		1-Aug-15	31-Aug-15
VA0081311	ENTEROCOCCI				2		1-Aug-15	31-Aug-15
VA0081311	CL2, TOTAL CONTACT			0.32			1-Aug-15	31-Aug-15
VA0081311	CL2, TOTAL FINAL				0.02	0.06	1-Aug-15	31-Aug-15
VA0081311	TN Year to Date				5.5		1-Aug-15	31-Aug-15
VA0081311	TP Year to Date				0.58		1-Aug-15	31-Aug-15
VA0081311	FLOW	9.95	11.29				1-Sep-15	30-Sep-15
VA0081311	pH			6.5		7.3	1-Sep-15	30-Sep-15
VA0081311	BOD5	69	100		2	3	1-Sep-15	30-Sep-15
VA0081311	TSS	44	62		1.2	1.6	1-Sep-15	30-Sep-15
VA0081311	COLIFORM, FECAL				3		1-Sep-15	30-Sep-15
VA0081311	TP				0.63		1-Sep-15	30-Sep-15
VA0081311	TN				5.9		1-Sep-15	30-Sep-15
VA0081311	ENTEROCOCCI				2		1-Sep-15	30-Sep-15
VA0081311	CL2, TOTAL CONTACT			0.25			1-Sep-15	30-Sep-15

VA0081311	CL2, TOTAL FINAL				<QL	<QL	1-Sep-15	30-Sep-15
VA0081311	TN Year to Date				5.5		1-Sep-15	30-Sep-15
VA0081311	TP Year to Date				0.59		1-Sep-15	30-Sep-15
VA0081311	FLOW	13.32	24.46				1-Oct-15	31-Oct-15
VA0081311	pH			6.6		7.2	1-Oct-15	31-Oct-15
VA0081311	BOD5	25	59		0	1	1-Oct-15	31-Oct-15
VA0081311	TSS	30	61		0.57	1.0	1-Oct-15	31-Oct-15
VA0081311	COLIFORM, FECAL				1		1-Oct-15	31-Oct-15
VA0081311	TP				0.42		1-Oct-15	31-Oct-15
VA0081311	TN				5.9		1-Oct-15	31-Oct-15
VA0081311	ENTEROCOCCI				3		1-Oct-15	31-Oct-15
VA0081311	CL2, TOTAL CONTACT			0.18			1-Oct-15	31-Oct-15
VA0081311	CL2, TOTAL FINAL				0.0065	0.014	1-Oct-15	31-Oct-15
VA0081311	TN Year to Date				5.6		1-Oct-15	31-Oct-15
VA0081311	TP Year to Date				0.57		1-Oct-15	31-Oct-15
VA0081311	FLOW	12.66	21.05				1-Nov-15	30-Nov-15
VA0081311	pH			6.4		7.2	1-Nov-15	30-Nov-15
VA0081311	BOD5	33	67		1	2	1-Nov-15	30-Nov-15
VA0081311	TSS	39	61		0.88	1.5	1-Nov-15	30-Nov-15
VA0081311	COLIFORM, FECAL				1		1-Nov-15	30-Nov-15
VA0081311	TP				0.26		1-Nov-15	30-Nov-15
VA0081311	TN				7.4		1-Nov-15	30-Nov-15
VA0081311	ENTEROCOCCI				1		1-Nov-15	30-Nov-15
VA0081311	CL2, TOTAL CONTACT			0.26			1-Nov-15	30-Nov-15
VA0081311	CL2, TOTAL FINAL				<QL	<QL	1-Nov-15	30-Nov-15
VA0081311	TN Year to Date				5.7		1-Nov-15	30-Nov-15
VA0081311	TP Year to Date				0.54		1-Nov-15	30-Nov-15
VA0081311	FLOW	12.86	17.15				1-Dec-15	31-Dec-15
VA0081311	pH			6.2		7.3	1-Dec-15	31-Dec-15
VA0081311	BOD5	52	143		1	3	1-Dec-15	31-Dec-15
VA0081311	TSS	30	55		0.64	1.3	1-Dec-15	31-Dec-15
VA0081311	COLIFORM, FECAL				1		1-Dec-15	31-Dec-15
VA0081311	TP				0.13		1-Dec-15	31-Dec-15
VA0081311	TN				7.3		1-Dec-15	31-Dec-15
VA0081311	ENTEROCOCCI				1		1-Dec-15	31-Dec-15
VA0081311	CL2, TOTAL CONTACT			0.38			1-Dec-15	31-Dec-15
VA0081311	CL2, TOTAL FINAL				<QL	<QL	1-Dec-15	31-Dec-15
VA0081311	TN Annual Avg				5.9		1-Jan-15	31-Dec-15
VA0081311	TN Year to Date				5.9		1-Dec-15	31-Dec-15
VA0081311	TP Year to Date				0.51		1-Dec-15	31-Dec-15
VA0081311	TP Annual Avg				0.51		1-Jan-15	31-Dec-15
VA0081311	FLOW	14.39	23.05				1-Jan-16	31-Jan-16
VA0081311	pH			6.7		7.3	1-Jan-16	31-Jan-16
VA0081311	BOD5	269	312		5	7	1-Jan-16	31-Jan-16
VA0081311	TSS	30	62		0.59	1.4	1-Jan-16	31-Jan-16
VA0081311	COLIFORM, FECAL				1		1-Jan-16	31-Jan-16
VA0081311	TP				0.23		1-Jan-16	31-Jan-16
VA0081311	TN				6.8		1-Jan-16	31-Jan-16
VA0081311	ENTEROCOCCI				1		1-Jan-16	31-Jan-16
VA0081311	CL2, TOTAL CONTACT			0.21			1-Jan-16	31-Jan-16
VA0081311	CL2, TOTAL FINAL				0.018	0.067	1-Jan-16	31-Jan-16
VA0081311	TN Year to Date				6.8		1-Jan-16	31-Jan-16
VA0081311	TP Year to Date				0.23		1-Jan-16	31-Jan-16

Austin, Deanna (DEQ)

From: Austin, Deanna (DEQ)
Sent: Monday, September 21, 2015 1:39 PM
To: Skiles, Keith (VDH); Aschenbach, Eric (VDH); Horne, Daniel (VDH)
Cc: Stagg, Ben (MRC); Sauer, Mark (DEQ)
Subject: HRSD York River VA0081311 Revoke and Reissuance
Attachments: York App to VDH 2015.pdf; Governor Letter and VMRC email.pdf; York App to DSS 2015.pdf; YRTPoutfall_01Sep15TM.PDF

Tracking:	Recipient	Delivery
	Skiles, Keith (VDH)	Delivered: 9/21/2015 1:39 PM
	Aschenbach, Eric (VDH)	Delivered: 9/21/2015 1:39 PM
	Horne, Daniel (VDH)	Delivered: 9/21/2015 1:39 PM
	Stagg, Ben (MRC)	Delivered: 9/21/2015 1:39 PM
	Sauer, Mark (DEQ)	Delivered: 9/21/2015 1:39 PM

Hi All-

I'm attaching a link to York River STP revoke and reissuance application for your review. I've also included the Governor's letter giving approval for the outfall relocation project and the result of the VMRC study. I've also attached an email from Commissioner Bull about the project. Because VMRC has already reviewed the project to great length, I did not include the DEQ typical letter to them with this group or request that DSS send their response to VMRC. If VMRC would like to make additional comment, please feel free. I've also attached the latest CORMIX model (which differs from the one in the application). This model and results have received preliminary approval from DEQ Central Office, with final approval expected this week. The mix that will most likely be approved is 122:1 for chronic and 39:1 for acute mixing.

If you have any questions about any of the attachments or would like to discuss, please feel free to contact me.

<http://www.deq.virginia.gov/files/share/wps/PERMIT/TRO/VDH,%20DSS,%20VMRC%20For%20Review/VA0081311%20HRSD-York%20River%20STP/>

Deanna Austin
DEQ-TRO Water Permits
5636 Southern Blvd
Virginia Beach, VA 23462
Phone: 757-518-2008
Fax: 757-518-2009

Sauer, Mark (DEQ)

From: Paylor, David (DEQ)
Sent: Monday, July 06, 2015 4:50 PM
To: Nold, Maria (DEQ)
Cc: Golden, James (DEQ)
Subject: FW: HRSD Outfall Pipe

From: Bull, John (MRC)
Sent: Thursday, June 25, 2015 9:13 AM
To: Paylor, David (DEQ)
Subject: HRSD Outfall Pipe

David,

In case this helps

In support of the *VMRC Evaluation and Certification on the Effects of Proposed Shellfish Condemnation, VPDES Permit No. 0081311* completed by Dr. Jim Wesson, and briefing materials prepared by my staff for the Governor regarding HRSD's proposed Yorktown outfall, the following statement is offered to summarize and frame the issues relating to this project's potential to impact shellfish resources in the York River.

There is no existing shellfish use now of the 79 acres of unassigned ground, currently open for the direct marketing of shellfish, that will be condemned by the Virginia Department of Health if the outfall is constructed. The ground holds the potential to support the commercial production and harvest of hard clam and oysters, however, a significant amount of effort and money would need to be invested for this to happen. To offset the loss of this potential resource, HRSD's agreement to construct a one acre oyster broodstock reef in the project vicinity will mitigate for, in VMRC's opinion, any perceived impacts now and in the foreseeable future. The reef is expected to provide for the larval recruitment of oysters to adjacent shellfish beds and should hopefully meet and/or exceed any benefits to existing shellfish resources anticipated from the commercial use of the aforementioned affected area.

John M.R. Bull
Commissioner
Virginia Marine Resources Commission
757-247-2205



COMMONWEALTH of VIRGINIA

Office of the Governor

Terence R. McAuliffe
Governor

June 2, 2015

Mr. David Cooley
Hampton Roads Sanitation District
2389 G Avenue
Newport News, Virginia 23602

Dear Mr. Cooley:

This will acknowledge and respond to your application to the Virginia Marine Resources Commission requesting authorization to use certain submerged lands of the Commonwealth to install a new outfall and diffuser from your York River Treatment Plant into the York River, adjacent to the Dominion Power Yorktown Power Station, in York County.

The Virginia Marine Resources Commission has reviewed your request and has indicated that, as currently designed with a 1.5 million gallon per day (MGD) effluent, this work will result in the condemnation of shellfish growing areas in the project's vicinity. The agency advises, however, that the aforementioned projected closures could likely be mitigated with the creation of a one-acre oyster broodstock sanctuary reef and a collaborative study, recommended by HRSD, with the Virginia Department of Health (VDH) and the Virginia Institute of Marine Science (VIMS). The study is intended to examine alternative and/or additive methodologies which improve the Commonwealth's ability to accurately determine shellfish condemnation zones necessary to preserve public health in waters adjacent to wastewater treatment facilities.

In light of the urgent need expressed by HRSD for this project, this letter shall constitute the formal approval you seek to use State-owned submerged lands and initiate construction by July 1, 2015. To protect anadromous fishes, all instream work associated with the project is restricted from February 15 to June 30 of any year. This approval recognizes your agreement to independently fund and work with VMRC, VDH and VIMS on finalizing the design considerations for both the sanctuary reef and collaborative study. This approval grants up to 15 MGD. Further, this approval does not grant authority for HRSD to encroach upon the property rights of others. Additionally, this approval does not convey any interest or title to either the beds or the overlying waters within the York River.

Sincerely,

A handwritten signature in dark ink, appearing to read "Terence R. McAuliffe", written over a large, stylized "C" that is part of the signature itself.

Terence R. McAuliffe

cc: John M. R. Bull, Commissioner



March 20, 2015

Mr. John Bull
Commissioner
Virginia Marine Resources Commission
2600 Washington Ave, 3rd Floor
Newport News, VA 23607

Dear Commissioner Bull: *John*

As we discussed earlier this month, HRSD has developed an initial strategy toward the mitigation of condemned oyster grounds resulting from the relocation of the outfall for our York River wastewater treatment facility. The following is a status update of our progress in this effort.

Identification of Condemnation Zones

The Virginia Department of Health (VDH) has expressed interest in developing a study in collaboration with HRSD and the Virginia Institute of Marine Science (VIMS) to support a data-driven mechanism for establishing closure zones around wastewater outfalls. VDH is a strong advocate of a data-driven decision process for developing closure zones and has provided some initial thoughts on potential avenues of study. VDH would like to explore alternative approaches to establishing closure zone such as in-stream monitoring of shellfish tissue and water column data for pathogen indicators, treatment plant process monitoring, etc. Numerical effluent dilution modeling and dye tracer studies may also be a possibility. After discussing potential avenues for research with other state shellfish managers and the FDA, VDH provided HRSD with an overview of the available information surrounding the use of alternate pathogen indicators and the associated data gaps. Based on that feedback, HRSD has developed an initial rough outline of the proposed research for VDH review. VDH will identify the appropriate technical resources at VIMS to collaborate with study plan development. HRSD will keep VMRC informed of progress on the development of the study plan and will seek the input of the agency on drafts.

If the FDA does not ultimately concur with the alternative approaches developed to identify closure zones around outfalls, the next avenue for consideration would be to ensure that the modeling used to calculate dilution contours factors in the dilution effects of an outfall diffuser and has appropriate temporal averaging intervals. This would also be approached through a collaborative effort with VDH and VIMS. The study is envisioned to take at least two years to complete to capture seasonal dynamics.

PO Box 5911, Virginia Beach, VA 23471-0911 • 757.460.7003

Commissioners: Vishnu K. Lakdawala, PhD, Chairman • Frederick N. Elofson, CPA, Vice-Chairman • Michael E. Glenn
Arthur C. Bredemeyer • Maurice P. Lynch, PhD • Stephen C. Rodriguez • Susan M. Rotkis • Willie Levenston, Jr.
www.hrsd.com

Oyster Mitigation Project

HRSD is working with the Chesapeake Bay Foundation (CBF) and VMRC to identify suitable sites for sanctuary reef creation in the vicinity of the York River Outfall. The reef structures will consist of a thin granite layer topped with reef balls and/or castles for substrate. HRSD and CBF conducted a site visit of the proposed locations on Monday, March 16. The areas of greatest interest were the Baylor Grounds in the vicinity of the outfall and east of the US Coast Guard pier and a 50 acre portion of open area to the east of the pier that has a pending lease application. The water depth in much of the Baylor Grounds was too deep for a sanctuary reef and an eelgrass restoration project headed by Dr. Robert Orth of VIMS is occurring in the shallow (<1 m) waters of the pending lease application. However, after discussing the initial findings from the site visit with Jim Wesson, we were able to identify a couple of potential sites within the northeastern corner of the pending lease application and the southern portion of the Baylor Grounds as denoted in the graphic below. The water depths within these areas appear to be between 1 and 4 meters, suitable for a reef structure while not impinging upon potential SAV habitat. HRSD will follow-up with an additional site visit to assess the depths and extent of available acreage in these specific areas. The goal is to construct these reefs in late 2015 or early 2016.



Finalizing these the specific details for these mitigation strategies will take more time than we have to ensure we do not miss the 2015 construction season for the York River Outfall. HRSD will continue to push as quickly as possible to finalize the details but I am asking you to

consider recommending the Governor approve our request, conditionally with the following requirements:

- Develop, fund and conduct a study in partnership with VDH and VIMS to further the science, methods and modeling used for identification of shell-fishing closure zones around wastewater treatment plant outfalls.
- In coordination with CBF and VMRC, plan, fund and construct oyster sanctuary reef (or reefs) in the York River in the vicinity of the York River Treatment Plant outfall.
- HRSD will spend no less than \$500,000 and no more than \$1,000,000 on these two mitigation strategies.

As you are well aware, HRSD did not create this problem and had no way of anticipating the need for this new outfall prior to Dominion Power's announcement related to the York River Power Station. We have pursued permitting and design as rapidly as possible and can only meet the early 2016 construction deadline if we receive the Governor's approval in very early April 2015.

Please contact me if there is anything else you need from me to keep this approval process moving forward. I will keep you apprised of our progress on the mitigation strategies and provide a formal agreement once the specific scopes are fully fleshed out.

Sincerely,

A handwritten signature in black ink, appearing to read "Ted Henifin".

Ted Henifin, PE
General Manager

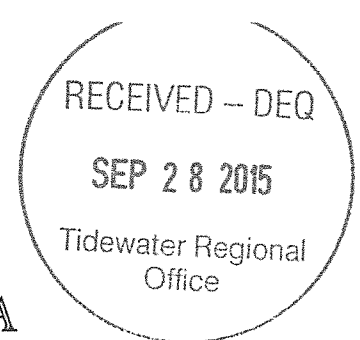


COMMONWEALTH of VIRGINIA

Marissa J. Levine, MD, MPH, FAAFP
State Health Commissioner

John J. Aulbach II, PE
Director, Office of Drinking Water

DEPARTMENT OF HEALTH
OFFICE OF DRINKING WATER
Southeast Virginia Field Office



830 Southampton Avenue
Suite 2058
Norfolk, VA 23510
Phone (757) 683-2000
Fax (757) 683-2007

DATE: September 22, 2015

FROM: DBH Daniel B. Horne, PE, Engineering Field Director
Southeast Virginia Field Office

TO: Ms. Deanna Dodson Austin, Water Permit Writer – Senior II
DEQ Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach, Virginia 23462

CITY/COUNTY: York County

APPLICANT: HRSD – York River STP

PERMIT TYPE: VPDES

APPLICATION TYPE: Re-Issuance

PROJECT: Revoke and reissue VPDES Permit No. VA0081311

SUBJECT: Review response for DEQ's permit application VA0081311

Our Office has reviewed the application to revoke and reissue VPDES Permit No. VA0081311 for discharge of treated effluent from the York River STP located in York County.

No public raw water intakes in Virginia were found downstream or upstream from the proposed new discharge point.

pc: VDH, ODW – Central Office
VDH, York County Health Dept.
Mr. Ted Henifin, General Manager, Hampton Roads Sanitation District

Austin, Deanna (DEQ)

From: Skiles, Keith (VDH)
Sent: Wednesday, January 13, 2016 10:57 AM
To: Austin, Deanna (DEQ); Aschenbach, Eric (VDH)
Subject: RE: HRSD York River STP VA0081311 Revoke and Reissue
Attachments: 14-0210_YR_outfall_Nov2014.pdf

Deanna,

I gather from looking at the information that the proposed location from the earlier correspondence is still the outfall site now. It was not as clear in this technical memo. If the proposed site is still the same, our comments from November 2014 (map attached) will provide our estimate of changes required in shellfish closure zones.

I apologize for the oversight in responding. Let me know if you have any questions or need anything else.

Keith

From: Austin, Deanna (DEQ)
Sent: Monday, January 11, 2016 8:29 AM
To: Aschenbach, Eric (VDH); Skiles, Keith (VDH)
Subject: FW: HRSD York River STP VA0081311 Revoke and Reissue

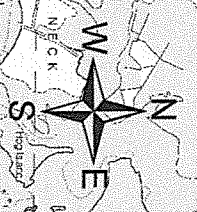
I still have not heard back from you guys on this. Please respond as soon as possible as I am ready to move forward with this revoke and reissuance.

Deanna Austin
Technical Coordinator DEQ-TRO Water Permits
5636 Southern Blvd
Virginia Beach, VA 23462
Phone: 757-518-2008
Fax: 757-518-2009

From: Austin, Deanna (DEQ)
Sent: Wednesday, December 09, 2015 2:40 PM
To: Aschenbach, Eric (VDH); Skiles, Keith (VDH)
Subject: HRSD York River STP VA0081311 Revoke and Reissue

Following up on this. I sent this to you on September 21st for review and comment and I don't think that I have heard anything back. Please let me know if you have any comments as I am getting ready to move it forward.

Deanna Austin
Technical Coordinator DEQ-TRO Water Permits
5636 Southern Blvd
Virginia Beach, VA 23462
Phone: 757-518-2008
Fax: 757-518-2009



- Proposed Prohibited
- Proposed Restricted

(37°14'00.1", -76°30'08.5")

Proposed STP outfall relocation

(37°13'02.6", -76°25'13.6")

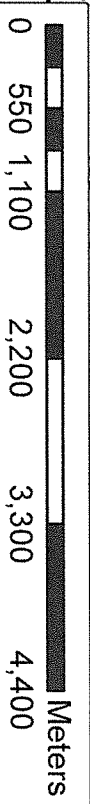
(37°13'05.9", -76°24'46.7")

(37°13'22.3", -76°24'46.3")

(37°14'29.4", -76°24'49.8")

November 14, 2014

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC
ADMINISTRATION
COAST SURVEY



Austin, Deanna (DEQ)

From: Skiles, Keith (VDH)
Sent: Tuesday, June 16, 2015 1:43 PM
To: Austin, Deanna (DEQ)
Subject: FW: HRSD 30MGD estimate
Attachments: 14-0210_HRSD-YR_2014-11-14.pdf

Deanna,

This is the only substantive correspondence that I had with VMRC after the October 27 email. If as you said they are not approved for the 30 mgd volume, it is probably not relevant.

Let me know if you need anything else.

Keith

From: Skiles, Keith (VDH)
Sent: Saturday, November 15, 2014 9:09 AM
To: Owen, Randy (MRC)
Subject: HRSD 30MGD estimate

Randy,

Attached is an estimate of a potential impact of an expansion to 30MGD at the HRSD York River proposed outfall relocation site if no changes were incorporated to the existing treatment type or disinfection. Upgrades prior to implementation of a 30MGD scenario would change these estimates and would require reassessment. Let me know if you have any questions.

Keith

B. Keith Skiles, MPH, Director
Division of Shellfish Sanitation
Virginia Department of Health
(804) 864-7477

COMMONWEALTH OF VIRGINIA
Department of Environmental Quality
Office of Water Permit Programs

Subject: HRSD York River Treatment Plant CORMIX Modeling – VA0081311

To: Deanna Austin, TRO

From: Houbao Li, OWPP

Date: December 8, 2015

Copies: Allan Brockenbrough, OWPP

I have reviewed the revised Hampton Roads Sanitation District (HRSD) York River CORMIX mixing analysis report prepared by HDR, Inc. dated December 01, 2015. HRSD is modifying the York River Treatment Plant (YRTP) outfall and adding a multi-port diffuser in response to Dominion Power's plan to shut down two of the generators at Yorktown Power Plant. The effluent dilution analysis followed by VADEQ mixing zone guidelines in accordance with 9VAC25-260-20 at the existing permit flow of 15 MGD. The acute dilution factor represents the average mixing for 1-hour critical period around low-water slack and it is determined as the average effluent dilution from calculations completed every 15 minutes for a 30 minutes window around low-water slack. The chronic dilution factor represents the near-field mixing over the entire approximately 12-hour tidal cycle and it is determined as the average effluent dilution from calculations completed every hour for a tidal cycle. I have used the CORMIX (v9.0) model to confirm the acute and chronic dilution factors proposed by HDR. The effluent dilution factors provided by HDR, Inc. are suitable for establishing acute and chronic wasteload allocations for the YRTP discharge. The calculated final effluent dilution factors are 29.8:1 for acute dilution and 114.6:1 for chronic dilution.

If you have any questions, please feel free to contact me at (804)-698-4213.

Austin, Deanna (DEQ)

From: Hunley, Will [WHUNLEY@HRSD.COM]
Sent: Wednesday, December 02, 2015 8:18 AM
To: Brockenbrough, Allan (DEQ); Austin, Deanna (DEQ)
Cc: Mitchell, Jamie; Grimmer, Lauren
Subject: York River Dilution Report - revised
Attachments: YRTPoutfall_01Dec15TM.pdf

Importance: High

Allan- Attached is the revised dilution report for the York River Outfall diffuser project. It is my understanding that this version resolves the remaining technical / Cormix details recently discussed between DEQ and HDR. Given that status would it be possible to get a review and approval by the end of next week - or perhaps sooner? The approval is time sensitive in this case because the field mobilization of the marine construction equipment (which has a limited window) requires the CTC and related approval of the dilution ratios. Thanks, -Will

Will Hunley

HRSD Environmental Scientist

Office: 757.460.4252 | Mobile: 757.633.2776

1434 Air Rail Avenue | Virginia Beach, VA 23455

PO Box 5911 | Virginia Beach, VA 23471-0911

whunley@hrsd.com | www.hrsd.com

Please consider the environment before printing this email.

Technical Memorandum

Date: Tuesday, December 01, 2015
Project: York River Treatment Plant – New Outfall Diffuser
To: Ann Copeland, Lauren Grimmer, Will Hunley (HRSD)
From: Andrew Thuman, Doug Fredericks (HDR)
Subject: Diffuser Design and Modeling Summary (Revised)

The revisions included in this technical memorandum from the 5/6/2015 version include: use of the latest version of CORMIX (v9.0); using an unbounded river cross-section for CORMIX input; distances at which the acute and chronic dilutions are achieved (Tables 2 and 3); diagram of the CORMIX model schematization; and a map of the acute and chronic mixing zones. These revisions are in accordance with the Virginia Department of Environmental Quality (VDEQ) regulations 9VAC25-260-20 as they relate to a discharge in an estuarine zone and as discussed further below.

The Hampton Roads Sanitation District (HRSD) owns and operates the York River Treatment Plant (YRTP) located in Seaford, Virginia. The YRTP currently discharges treated effluent to Dominion's Yorktown Power Plant (YPP) cooling water discharge canal prior to it reaching the York River. With Dominion's plans to shutdown two generators at the YPP, the only flow discharging into the cooling water canal will be from the YRTP and intermittent flow from the YPP's Unit 3 generator. As a result, the YRTP effluent discharge would not be sufficiently mixed to achieve desired dilution before reaching the York River. HRSD requested that a new outfall and diffuser to the York River be analyzed to determine whether acceptable dilutions can be achieved. A technical memorandum dated October 16, 2013 provided the effluent dilution modeling results for the proposed outfall to the York River using site-specific tidal currents and stage data. The site-specific tidal data used the acoustic wave and current profiler (AWAC) data collected by the Virginia Institute of Marine Sciences (VIMS) from 2006-2010 near the mouth of the York River, north of the Goodwin Islands, approximately 3.3 miles from the proposed outfall location.

Mixing Zone Guidance

The dilution analyses followed the VDEQ mixing zone guidelines that are based on prior mixing zone interpretations and mixing zone results at other VPDES facilities and are in accordance with 9VAC25-260-20 as they relate to the YRTP discharge in an estuarine zone. The model CORMIX was used to calculate the effluent dilution with the multi-port diffuser sub-model (CORMIX2) using the tidal build-up option. Readily available river data were used for the dilution analyses as provided by HRSD (VIMS AWAC current and stage), NOAA (river bathymetry), and the Chesapeake Bay Program (river salinity and temperature profiles).

The following approach was followed to determine acute and chronic dilutions and mixing zone distances:

- Acute dilution was represented as the near-field mixing for the critical 1-hour period around low-water slack tide;
 - This was determined as the average effluent dilution from calculations completed every 15 minutes for a 30 minute window around low-water slack tide. The final dilution values used were determined as the minimum of that calculated at the end of the near-field region (NFR) as determined in CORMIX, at a distance that is 5 times the average depth along a line

extending 1/3 of the way across the receiving water from the discharge point to the opposite shore (9VAC25-260-20.B.2), or as defined by 9VAC25-260-20.B.3.

- Chronic dilution was represented as the near-field mixing over the entire approximately 12-hour tidal cycle;
 - This was determined as the average effluent dilution from calculations completed every hour for a tidal cycle (12 values). The final dilution values were determined as the minimum calculated at the end of the NFR (as determined in CORMIX) or at a distance that is 5 times the average depth along a line extending 1/3 of the way across the receiving water from the discharge point to the opposite shore (9VAC25-260-20.B.2).

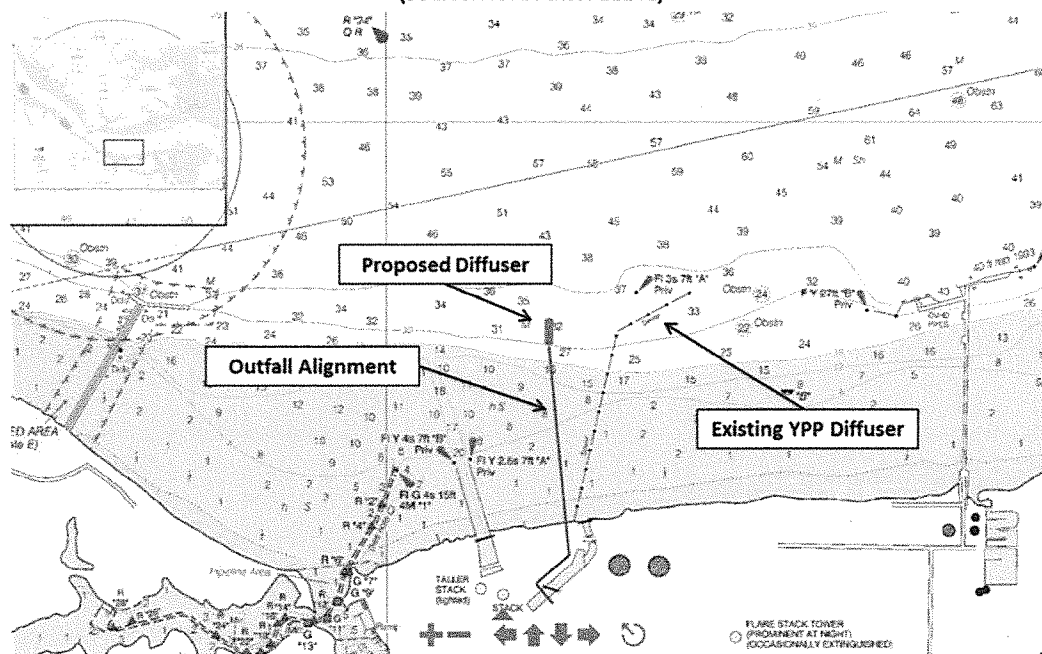
Based on the NOAA bathymetric contours from Nautical Chart 12241, an average depth of 44 feet was estimated along a line extending 1/3 of the way across the river from the discharge point to the opposite shore. The regulatory mixing zone (RMZ) distance determined from this average depth is 220 feet (5 times the average depth). Figure 1 presents NOAA bathymetry around the proposed outfall site along with the proposed diffuser location and the existing YPP diffuser location.

YRTP Outfall Diffuser

The proposed YRTP diffuser is designed for two flow tiers: the existing permit flow of 15 MGD; and a projected future flow of 30 MGD. The overall diffuser was designed for the projected future flow and consists of 32 ports with an overall diffuser length of 372 feet. For the current permitting effort at the existing permit flow of 15 MGD, 16 of the 32 ports will be plugged and inoperable such that the diffuser analyzed here consists of 16 ports with a diffuser length of 180 feet. Sensitivity analyses were completed to determine the optimal diffuser length (port spacing) and diffuser depth, which resulted in selection of a 12 foot port spacing with the diffuser placed in a water depth of 30 feet. A summary of the river, YRTP

Figure 1. NOAA Bathymetry & Approximate Diffuser Location

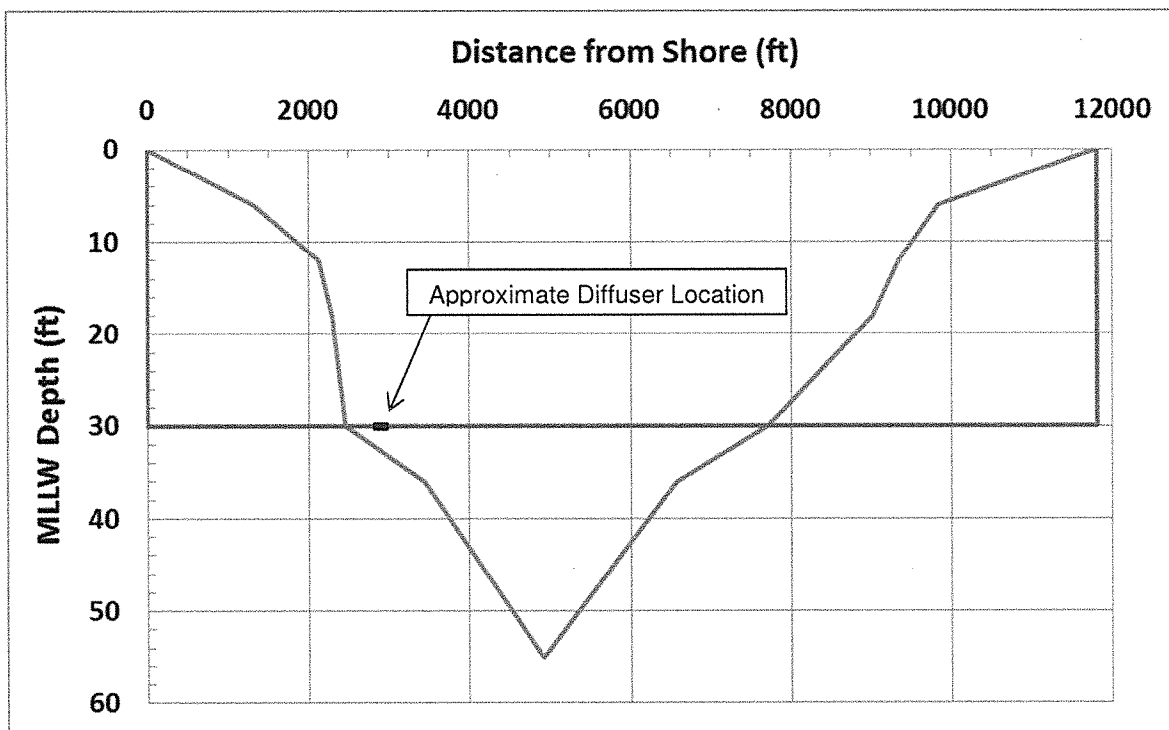
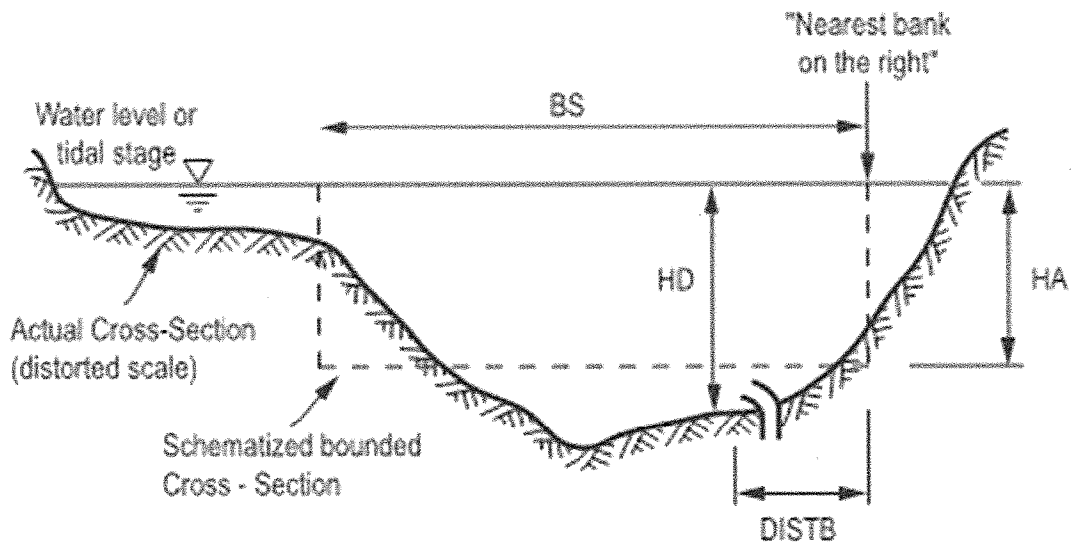
(Source: NOAA Chart 12241)



and diffuser design conditions used for the CORMIX modeling are presented in Table 1. Figure 2 presents a schematic diagram of the YRTP diffuser setup in CORMIX.

The York River tidal stage and currents used in the CORMIX modeling are presented in Figure 3 for a typical neap tidal cycle. These model inputs were developed from the site-specific tidal AWAC data collected by VIMS in 2007 near the mouth of the York River. The VIMS tidal current data was analyzed to extract current data for neap tide periods for the entire year that were lined up in time and averaged for use in developing the model inputs. Figure 4 presents the averaging process for the neap tidal cycle with the range bars representing the 5th and 95th percentiles of the current speed during each portion of the tidal cycle over the year. Tidal stage was calculated in a similar manner with the exception that elevations were filtered to remove the noise from meteorological events, so only the pure tide was analyzed (see Figure 5). An average neap tide range of 0.61 meters was used for model input.

Table 1. River, Effluent & Diffuser Design Conditions	
Parameter	Value
River	
River Currents & Stage	Based on VIMS AWAC Data at Neap Tide
River Salinity	20.6 ppt
River Temperature	25.7°C
Effluent	
Permitted Design Flow	15 MGD
Effluent Salinity	0 ppt
Effluent Temperature	26.5°C
Diffuser	
# of ports	16
Port Diameter	8 inches
Port Horizontal Angle	15°
Port Height above Bottom	2 feet
Port Spacing	12 feet
Diffuser Length	180 feet
Port Arrangement	Alternating
Diffuser Alignment	Perpendicular to River Flow
Water Depth at Diffuser	30 feet below MLLW
Diffuser Distance from Shore	2,800 feet



BS – River width = 3,600 meters (11,812 feet)

DISTB – Diffuser distance from shoreline = 853 meters (2,800 feet)

HD – Water depth at diffuser = 9.14 meters (30 feet) at MLLW (note: varied as a function of tide)

HA – Average water depth = 8.23 meters (27 feet) at MLLW (note: varied as a function of tide)

Figure 2. CORMIX Schematic Diagrams

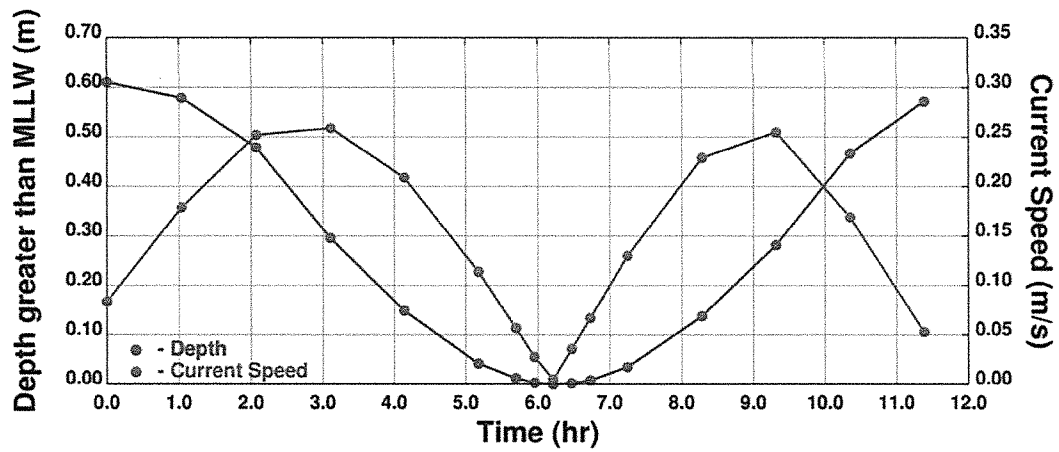


Figure 3. Neap Tide Stage and Currents used for Model Input

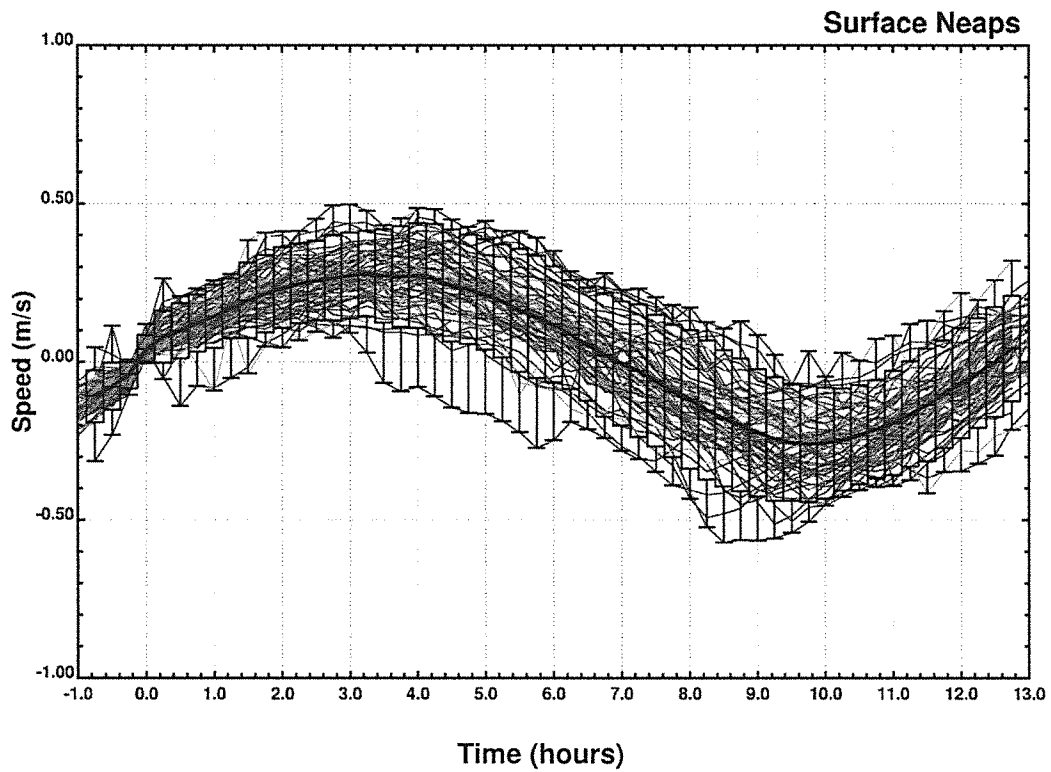


Figure 4. Typical Neap Tidal Current Analysis

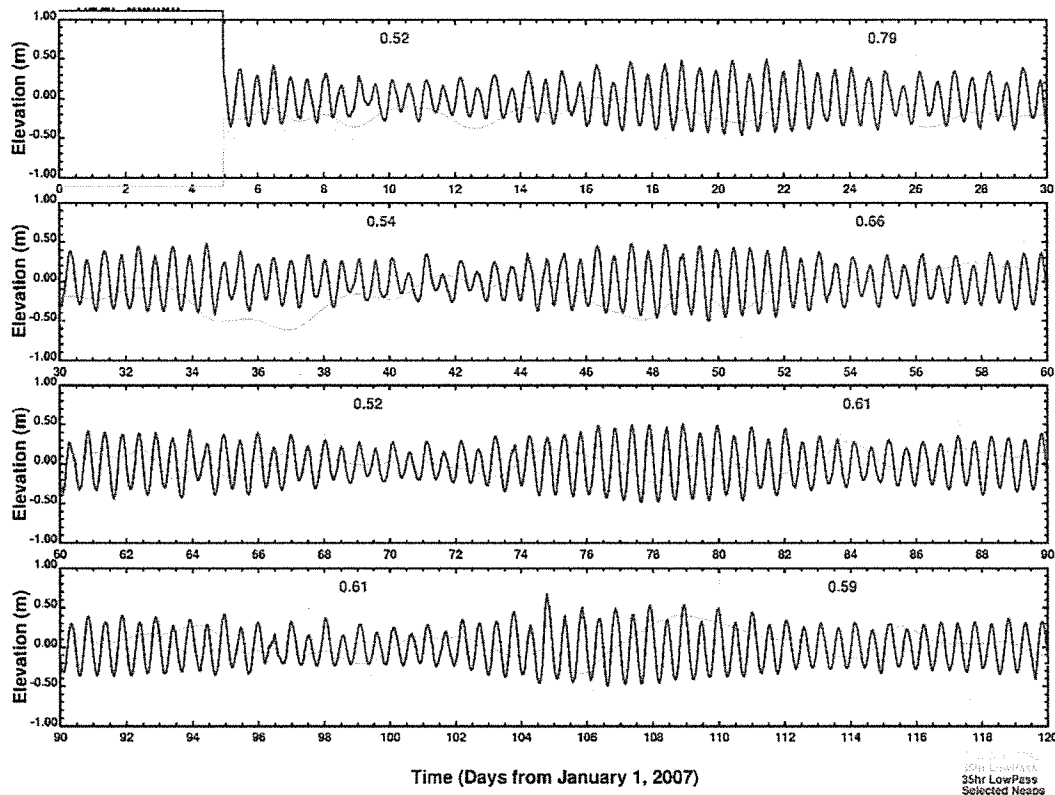


Figure 5. Tidal Stage Data with Neap Tide Periods Highlighted

Based on the final design conditions presented in Table 1, acute and chronic effluent dilutions at the edge of the regulatory mixing zone (RMZ) were calculated in accordance with the VDEQ mixing zone guidelines in 9VAC25-260-20 as they relate to the YRTP discharge in an estuarine zone. Figure 6 presents a schematic of the final diffuser design for the new YRTP outfall. In addition, the tidal average dilutions were calculated from progressive sets of model output. For example, the average acute dilution consisted of averaging the dilutions for: 30-minutes before and 15-minutes before; 15-minutes before and slack; slack and 15-minutes after; and 15-minutes after and 30-minutes after. The final effluent dilutions calculated at the edge of the RMZ are 29.8:1 for acute dilution and 114.6:1 for chronic dilution. Tables 2 and 3 present the effluent dilutions calculated at each point in the tidal cycle with the CORMIX model that were used to calculate the final acute and chronic effluent dilution values. The acute effluent dilutions ranged from 9-70:1 and the chronic effluent dilutions ranged from 12-193:1. These tables also present the distances to achieve the dilutions along with the travel time to reach the dilutions. The average distance to achieve the average acute dilution of 29.8:1 is 45 feet and the average distance to achieve the average chronic dilution of 114.6:1 is 87 feet. The chronic mixing zone distance is less than the maximum RMZ of 220 feet as allowed in 9VAC25-260-20.B.2.b. For the acute dilution values the travel time to reach these dilutions is less than 4 minutes; and for the chronic dilution values, the travel time to reach these dilutions is less than 7 minutes. Figure 7 presents a map of the average acute and chronic mixing zones along with the maximum RMZ.

Additional detail on the diffuser analyses is contained in the HDR technical memorandum dated October 16, 2013. The CORMIX model files used to complete these analyses are contained in Attachments 1 and 2.

Table 2. Slack Tide Effluent Dilutions (Acute)				
Tidal Period	Time (hrs)	RMZ Effluent Dilution	Distance to Achieve Dilution (ft)	Travel Time to Achieve Dilution (min)
Hours before MLW	0.518	70.3	135.8	3.8
Hours before MLW	0.259	49.8	63.3	1.3
Slack	0.000	12.3	0.0	0.2
Hours after MLW	0.259	9.1	17.5	0.2
Hours after MLW	0.518	25.9	65.2	1.3
Average		29.8	45.3	1.1

Table 3. Tidal Cycle Effluent Dilutions (Chronic)				
Tidal Period	Time (hrs)	RMZ Effluent Dilution	Distance to Achieve Dilution (ft)	Travel Time to Achieve Dilution (min)
Hours before MLW	3.105	192.6	155.4	5.9
Hours before MLW	2.070	167.4	66.5	1.3
Hours before MLW	1.035	102.0	76.8	2.8
Slack	0.000	12.3	0.0	0.2
Hours after MLW	1.035	101.2	73.1	2.3
Hours after MLW	2.070	151.5	152.4	6.5
Hours after MLW	3.105	175.0	155.0	6.0
Hours before MHW	2.070	144.9	69.2	1.6
Hours before MHW	1.035	73.0	140.1	4.0
Slack	0.000	13.9	0.0	0.2
Hours after MHW	1.035	138.0	68.5	1.5
Hours after MHW	2.070	169.9	158.6	6.2
Average		114.6	87.2	3.0

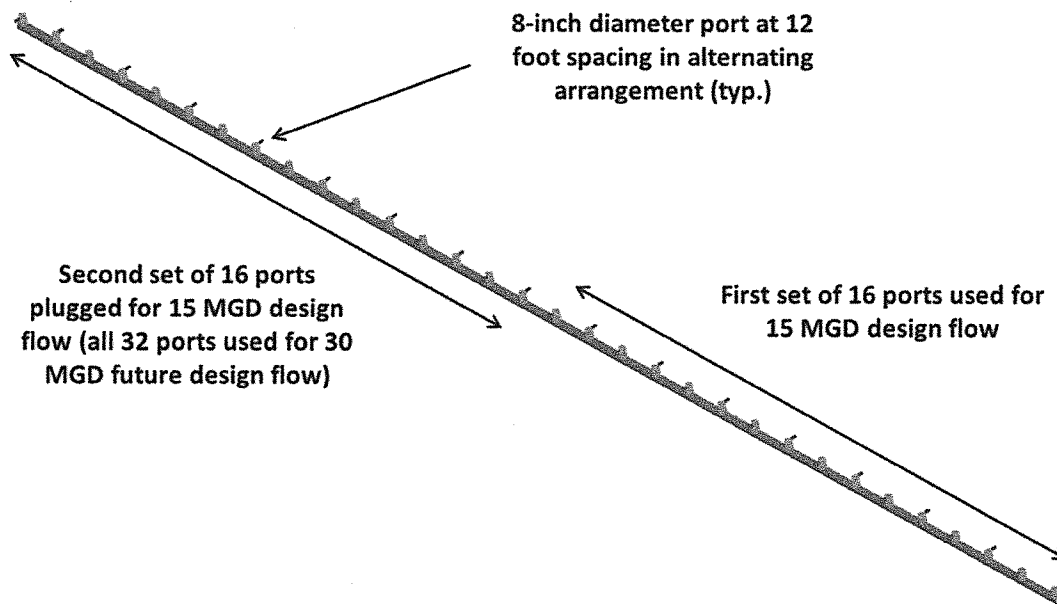


Figure 6. Schematic of YRTP Diffuser



HRSD YORK RIVER TREATMENT PLANT
PROPOSED MIXING ZONES
FIGURE 7

ATTACHMENT 1

CORMIX MODEL OUTPUT (ACUTE)

```

Momentum fluxes:      m0      =0.6840E-02      M0      =0.3753E+00
lQ=B      =      0.021 lM      =      0.46 lM      =      2.11 lmp      = 99999.00
LQ      =      0.484 LM      =      1.52 Lm      =      10.75 Lmp      = 99999.00
Properties of riser group with 1 ports/nozzles each:
U0      =      0.571 D0      =      0.303 A0      =      0.072 THETA =      90.00
FR0      =      10.13 FRD0      =      2.67 R      =      10.02
(slot)      (riser group)

```


The pollutant concentration in the plume falls below CMC value of 0.100E+02
in the current prediction interval.

This is the extent of the TOXIC DILUTION ZONE.

7.20	0.00	3.25	10.3	0.974E+01	0.82	0.82	0.205	.21387E+02
8.04	0.00	3.32	11.4	0.877E+01	0.87	0.87	0.194	.24658E+02
8.87	0.00	3.40	12.6	0.796E+01	0.93	0.93	0.185	.28060E+02
9.70	0.00	3.47	13.8	0.726E+01	0.99	0.99	0.177	.31583E+02
10.54	0.00	3.54	15.0	0.667E+01	1.04	1.04	0.170	.35220E+02
11.37	0.00	3.61	16.2	0.616E+01	1.09	1.09	0.164	.38962E+02
12.20	0.00	3.68	17.5	0.571E+01	1.15	1.15	0.158	.42802E+02
13.04	0.00	3.75	18.8	0.531E+01	1.20	1.20	0.153	.46736E+02
13.87	0.00	3.82	20.2	0.496E+01	1.25	1.25	0.149	.50757E+02
14.70	0.00	3.89	21.5	0.465E+01	1.30	1.30	0.145	.54862E+02
15.53	0.00	3.95	22.9	0.437E+01	1.35	1.35	0.141	.59022E+02
16.37	0.00	4.02	24.3	0.411E+01	1.40	1.40	0.138	.63282E+02
17.20	0.00	4.09	25.8	0.388E+01	1.45	1.45	0.135	.67613E+02
18.03	0.00	4.15	27.2	0.367E+01	1.50	1.50	0.132	.72014E+02
18.87	0.00	4.22	28.7	0.348E+01	1.55	1.55	0.129	.76481E+02
19.70	0.00	4.28	30.2	0.331E+01	1.60	1.60	0.126	.81012E+02
20.54	0.00	4.34	31.7	0.315E+01	1.64	1.64	0.124	.85606E+02
21.37	0.00	4.41	33.3	0.300E+01	1.69	1.69	0.122	.90258E+02
22.20	0.00	4.47	34.9	0.287E+01	1.74	1.74	0.120	.94969E+02
23.04	0.00	4.53	36.5	0.274E+01	1.78	1.78	0.118	.99735E+02

Merging of individual jet/plumes to form plane jet/plume:

23.85	0.00	4.59	47.9	0.209E+01	2.29	29.72	0.082	.10446E+03
24.70	0.00	4.65	49.0	0.204E+01	2.34	29.78	0.082	.11058E+03
25.54	0.00	4.70	50.0	0.200E+01	2.40	29.83	0.082	.11661E+03
26.37	0.00	4.75	51.1	0.196E+01	2.45	29.88	0.082	.12264E+03
27.21	0.00	4.80	52.2	0.192E+01	2.50	29.93	0.082	.12866E+03
28.04	0.00	4.86	53.2	0.188E+01	2.55	29.98	0.082	.13468E+03
28.87	0.00	4.91	54.3	0.184E+01	2.60	30.03	0.082	.14071E+03
29.71	0.00	4.96	55.4	0.181E+01	2.65	30.08	0.082	.14673E+03
30.54	0.00	5.02	56.4	0.177E+01	2.70	30.14	0.082	.15275E+03
31.38	0.00	5.07	57.5	0.174E+01	2.75	30.19	0.082	.15876E+03
32.21	0.00	5.12	58.5	0.171E+01	2.81	30.24	0.082	.16475E+03
33.04	0.00	5.18	59.6	0.168E+01	2.86	30.29	0.082	.17076E+03
33.88	0.00	5.23	60.7	0.165E+01	2.91	30.34	0.082	.17678E+03
34.71	0.00	5.28	61.7	0.162E+01	2.96	30.39	0.082	.18279E+03
35.55	0.00	5.34	62.8	0.159E+01	3.01	30.44	0.082	.18880E+03
36.38	0.00	5.39	63.9	0.157E+01	3.06	30.49	0.082	.19482E+03
37.21	0.00	5.45	64.9	0.154E+01	3.11	30.55	0.082	.20079E+03
38.05	0.00	5.50	66.0	0.152E+01	3.17	30.60	0.082	.20680E+03
38.88	0.00	5.55	67.1	0.149E+01	3.22	30.65	0.082	.21281E+03
39.71	0.00	5.61	68.1	0.147E+01	3.27	30.70	0.082	.21881E+03
40.55	0.00	5.66	69.2	0.144E+01	3.32	30.75	0.082	.22482E+03
41.38	0.00	5.72	70.3	0.142E+01	3.37	30.80	0.082	.23079E+03

Cumulative travel time = 230.7879 sec (0.06 hrs)

END OF CORJET (MOD110): JET/PLUME NEAR-FIELD MIXING REGION

BEGIN MOD232: LAYER BOUNDARY IMPINGEMENT/UPSTREAM SPREADING

Vertical angle of layer/boundary impingement = 3.73 deg
Horizontal angle of layer/boundary impingement = 0.00 deg

UPSTREAM INTRUSION PROPERTIES:

Upstream intrusion length = 181.06 m
X-position of upstream stagnation point = -139.68 m
Thickness in intrusion region = 1.01 m
Half-width at downstream end = 272.10 m
Thickness at downstream end = 2.22 m


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Momentum fluxes:  m0      =0.6840E-02  M0      =0.3753E+00
lQ=B   =      0.021  lM     =      0.46   lm      =      8.72   lmp    = 99999.00
LQ     =      0.484  LM     =      1.52   Lm      =     21.88   Lmp    = 99999.00
Properties of riser group with 1 ports/nozzles each:
U0     =      0.571  D0     =      0.303  A0      =      0.072  THETA  =      90.00
FR0    =     10.13  FRD0   =      2.67  R        =     20.39
(slot)      (riser group)

```


3.16	0.00	4.08	7.1	0.140E+02	0.63	0.63	0.334	.86646E+01
3.56	0.00	4.18	7.8	0.128E+02	0.67	0.67	0.321	.98183E+01
3.96	0.00	4.28	8.5	0.118E+02	0.71	0.71	0.310	.11011E+02
4.35	0.00	4.37	9.1	0.110E+02	0.74	0.74	0.300	.12243E+02
4.75	0.00	4.46	9.8	0.102E+02	0.78	0.78	0.290	.13511E+02

** CMC HAS BEEN FOUND **

The pollutant concentration in the plume falls below CMC value of 0.100E+02 in the current prediction interval.

This is the extent of the TOXIC DILUTION ZONE.

5.16	0.00	4.54	10.4	0.957E+01	0.82	0.82	0.282	.14816E+02
5.56	0.00	4.61	11.1	0.899E+01	0.85	0.85	0.274	.16171E+02
5.96	0.00	4.69	11.8	0.847E+01	0.89	0.89	0.267	.17546E+02
6.37	0.00	4.76	12.5	0.800E+01	0.92	0.92	0.260	.18952E+02
6.77	0.00	4.83	13.2	0.758E+01	0.95	0.95	0.254	.20390E+02
7.17	0.00	4.91	13.9	0.719E+01	0.99	0.99	0.249	.21857E+02
7.57	0.00	4.98	14.6	0.684E+01	1.02	1.02	0.244	.23352E+02
7.98	0.00	5.05	15.4	0.651E+01	1.06	1.06	0.239	.24873E+02
8.38	0.00	5.12	16.1	0.621E+01	1.09	1.09	0.235	.26421E+02
8.78	0.00	5.19	16.8	0.594E+01	1.12	1.12	0.230	.27994E+02
9.19	0.00	5.26	17.6	0.568E+01	1.15	1.15	0.227	.29590E+02
9.59	0.00	5.33	18.4	0.544E+01	1.19	1.19	0.223	.31210E+02
9.99	0.00	5.40	19.2	0.522E+01	1.22	1.22	0.220	.32853E+02
10.40	0.00	5.46	20.0	0.501E+01	1.25	1.25	0.217	.34517E+02
10.80	0.00	5.53	20.8	0.482E+01	1.28	1.28	0.214	.36203E+02
11.20	0.00	5.60	21.6	0.464E+01	1.31	1.31	0.211	.37909E+02
11.61	0.00	5.67	22.4	0.446E+01	1.34	1.34	0.208	.39655E+02
12.01	0.00	5.73	23.2	0.430E+01	1.38	1.38	0.205	.41401E+02
12.42	0.00	5.80	24.1	0.415E+01	1.41	1.41	0.203	.43167E+02
12.82	0.00	5.87	24.9	0.401E+01	1.44	1.44	0.200	.44951E+02
13.22	0.00	5.93	25.8	0.388E+01	1.47	1.47	0.198	.46754E+02
13.63	0.00	6.00	26.7	0.375E+01	1.50	1.50	0.196	.48574E+02
14.03	0.00	6.06	27.5	0.363E+01	1.53	1.53	0.194	.50412E+02
14.44	0.00	6.13	28.4	0.352E+01	1.56	1.56	0.192	.52268E+02
14.84	0.00	6.19	29.3	0.341E+01	1.59	1.59	0.190	.54140E+02
15.24	0.00	6.25	30.2	0.331E+01	1.62	1.62	0.188	.56028E+02
15.65	0.00	6.32	31.2	0.321E+01	1.65	1.65	0.186	.57933E+02
16.05	0.00	6.38	32.1	0.312E+01	1.68	1.68	0.184	.59855E+02
16.46	0.00	6.44	33.0	0.303E+01	1.71	1.71	0.183	.61791E+02
16.86	0.00	6.51	34.0	0.294E+01	1.74	1.74	0.181	.63743E+02
17.27	0.00	6.57	34.9	0.286E+01	1.77	1.77	0.179	.65733E+02
17.67	0.00	6.63	35.9	0.279E+01	1.80	1.80	0.178	.67716E+02

Merging of individual jet/plumes to form plane jet/plume:

18.02	0.00	6.69	47.7	0.209E+01	2.29	29.72	0.125	.69428E+02
18.48	0.00	6.75	48.5	0.206E+01	2.33	29.76	0.125	.72498E+02
18.89	0.00	6.81	49.2	0.203E+01	2.36	29.79	0.125	.75174E+02
19.29	0.00	6.86	49.8	0.201E+01	2.39	29.82	0.125	.77828E+02

Cumulative travel time = 77.8283 sec (0.02 hrs)

END OF CORJET (MOD110): JET/PLUME NEAR-FIELD MIXING REGION

BEGIN MOD232: LAYER BOUNDARY IMPINGEMENT/UPSTREAM SPREADING

Vertical angle of layer/boundary impingement = 7.40 deg
Horizontal angle of layer/boundary impingement = 0.00 deg

UPSTREAM INTRUSION PROPERTIES:

Upstream intrusion length	=	1288.52 m
X-position of upstream stagnation point	=	-1269.23 m
Thickness in intrusion region	=	0.27 m
Half-width at downstream end	=	1648.59 m
Thickness at downstream end	=	0.81 m

222

0.00	0.00	3.73	2.7	0.364E+02	0.31	0.31	0.620	.23572E+01
0.00	0.00	3.85	2.9	0.341E+02	0.33	0.33	0.611	.25589E+01
0.00	0.00	3.98	3.1	0.320E+02	0.34	0.34	0.603	.27708E+01
0.00	0.00	4.11	3.3	0.302E+02	0.35	0.35	0.596	.29777E+01
0.00	0.00	4.23	3.5	0.285E+02	0.36	0.36	0.589	.31872E+01
0.00	0.00	4.35	3.7	0.270E+02	0.38	0.38	0.582	.33991E+01
0.00	0.00	4.48	3.9	0.255E+02	0.39	0.39	0.576	.36214E+01
0.00	0.00	4.61	4.1	0.242E+02	0.40	0.40	0.570	.38381E+01
0.00	0.00	4.73	4.3	0.231E+02	0.41	0.41	0.564	.40570E+01
0.00	0.00	4.86	4.6	0.220E+02	0.43	0.43	0.558	.42782E+01
0.00	0.00	4.98	4.8	0.209E+02	0.44	0.44	0.553	.45100E+01
0.00	0.00	5.11	5.0	0.200E+02	0.45	0.45	0.547	.47356E+01
0.00	0.00	5.23	5.2	0.191E+02	0.46	0.46	0.542	.49633E+01
0.00	0.00	5.36	5.5	0.183E+02	0.47	0.47	0.538	.51930E+01
0.00	0.00	5.48	5.7	0.175E+02	0.49	0.49	0.533	.54335E+01
0.00	0.00	5.61	6.0	0.168E+02	0.50	0.50	0.528	.56673E+01
0.00	0.00	5.73	6.2	0.161E+02	0.51	0.51	0.524	.59031E+01
0.00	0.00	5.86	6.5	0.155E+02	0.52	0.52	0.520	.61497E+01
0.00	0.00	5.99	6.7	0.149E+02	0.54	0.54	0.516	.63893E+01
0.00	0.00	6.11	7.0	0.143E+02	0.55	0.55	0.512	.66309E+01
0.00	0.00	6.23	7.2	0.138E+02	0.56	0.56	0.508	.68742E+01
0.00	0.00	6.36	7.5	0.133E+02	0.57	0.57	0.504	.71285E+01
0.00	0.00	6.49	7.8	0.129E+02	0.59	0.59	0.501	.73755E+01
0.00	0.00	6.61	8.1	0.124E+02	0.60	0.60	0.497	.76242E+01
0.00	0.00	6.73	8.3	0.120E+02	0.61	0.61	0.494	.78747E+01
0.00	0.00	6.86	8.6	0.116E+02	0.62	0.62	0.490	.81362E+01
0.00	0.00	6.99	8.9	0.112E+02	0.64	0.64	0.487	.83901E+01
0.00	0.00	7.11	9.2	0.109E+02	0.65	0.65	0.484	.86457E+01
0.00	0.00	7.24	9.5	0.105E+02	0.66	0.66	0.481	.89029E+01
0.00	0.00	7.36	9.8	0.102E+02	0.67	0.67	0.478	.91713E+01

** CMC HAS BEEN FOUND **

The pollutant concentration in the plume falls below CMC value of 0.100E+02 in the current prediction interval.

This is the extent of the TOXIC DILUTION ZONE.

0.00	0.00	7.49	10.1	0.991E+01	0.69	0.69	0.475	.94317E+01
0.00	0.00	7.61	10.4	0.962E+01	0.70	0.70	0.472	.96937E+01
0.00	0.00	7.74	10.7	0.935E+01	0.71	0.71	0.469	.99573E+01
0.00	0.00	7.87	11.0	0.908E+01	0.72	0.72	0.467	.10232E+02
0.00	0.00	7.99	11.3	0.883E+01	0.74	0.74	0.464	.10499E+02
0.00	0.00	8.11	11.6	0.859E+01	0.75	0.75	0.461	.10767E+02
0.00	0.00	8.24	12.0	0.835E+01	0.76	0.76	0.459	.11047E+02
0.00	0.00	8.37	12.3	0.813E+01	0.77	0.77	0.456	.11311E+02

Cumulative travel time = 11.3111 sec (0.00 hrs)

Merging of individual jet/plumes not found in this module, but interaction will occur in following module. Overall jet/plume interaction dimensions:

0.00	0.00	8.37	12.3	0.813E+01	0.77	27.58	0.456	.11311E+02
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END OF CORJET (MOD110): JET/PLUME NEAR-FIELD MIXING REGION

BEGIN MOD232: LAYER BOUNDARY IMPINGEMENT/UPSTREAM SPREADING

Vertical angle of layer/boundary impingement = 90.00 deg
Horizontal angle of layer/boundary impingement = 0.00 deg

Discharge into STAGNANT AMBIENT environment:

STEADY-STATE MIXING CONDITION IS NOT POSSIBLE in this zone,
even though some ADDITIONAL DILUTION MAY OCCUR!

Also, all far-field processes will be UNSTEADY.
SIMULATION STOPS because of stagnant ambient conditions.

END OF MOD232: LAYER BOUNDARY IMPINGEMENT/UPSTREAM SPREADING


```

Momentum fluxes:  m0      =0.6840E-02  M0      =0.3753E+00
lQ=B   =      0.021  lM   =      0.46  lm   =      5.28  lmp   = 99999.00
LQ     =      0.484  LM   =      1.52  Lm   =     17.02  Lmp   = 99999.00
Properties of riser group with 1 ports/nozzles each:
U0     =      0.571  D0   =      0.303  A0   =      0.072  THETA =      90.00
FR0    =     10.13  FRD0  =      2.67  R    =     15.86
(slot)      (riser group)

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```

Momentum fluxes:  m0      =0.6840E-02  M0      =0.3753E+00
lQ=B   =      0.021 lM   =      0.46 lM   =      1.52 lmp   = 99999.00
LQ     =      0.484 LM   =      1.52 Lm   =      9.14 Lmp   = 99999.00
Properties of riser group with 1 ports/nozzles each:
U0     =      0.571 D0   =      0.303 A0   =      0.072 THETA =      90.00
FR0    =      10.13 FRD0 =      2.67 R     =      8.52
(slot)      (riser group)

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ATTACHMENT 2

CORMIX MODEL OUTPUT (CHRONIC)

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Momentum fluxes:  m0      =0.6840E-02  M0      =0.3753E+00
lQ=B   =      0.021  lM   =      0.46  lm   =      0.10  lmp   = 99999.00
LQ     =      0.484  LM   =      1.52  Lm   =      2.37  Lmp   = 99999.00
Properties of riser group with 1 ports/nozzles each:
U0     =      0.571  D0   =      0.303  A0   =      0.072  THETA =      90.00
FR0    =      10.13  FRD0 =      2.67  R     =      2.20
(slot)      (riser group)

```


0.95	0.00	0.69	30.5	0.328E+01	0.21	27.45	.71180E+01
1.89	0.00	0.77	42.7	0.234E+01	0.39	27.46	.14236E+02
2.84	0.00	0.86	51.9	0.193E+01	0.58	27.48	.21354E+02
3.79	0.00	0.94	59.7	0.168E+01	0.77	27.49	.28472E+02
4.74	0.00	1.02	66.5	0.150E+01	0.96	27.51	.35590E+02
5.68	0.00	1.10	72.6	0.138E+01	1.15	27.52	.42708E+02
6.63	0.00	1.19	78.2	0.128E+01	1.34	27.54	.49826E+02
7.58	0.00	1.27	83.3	0.120E+01	1.53	27.55	.56944E+02
8.52	0.00	1.35	88.1	0.113E+01	1.72	27.57	.64062E+02
9.47	0.00	1.43	92.7	0.108E+01	1.91	27.58	.71180E+02
10.42	0.00	1.52	97.0	0.103E+01	2.10	27.60	.78298E+02

** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **

The pollutant concentration in the plume falls below water quality standard or CCC value of 0.100E+01 in the current prediction interval.

This is the spatial extent of concentrations exceeding the water quality standard or CCC value.

11.36	0.00	1.60	101.0	0.990E+00	2.29	27.61	.85416E+02
12.31	0.00	1.68	104.9	0.953E+00	2.47	27.63	.92534E+02
13.26	0.00	1.76	108.6	0.921E+00	2.66	27.64	.99652E+02
14.21	0.00	1.85	112.2	0.891E+00	2.85	27.66	.10677E+03
15.15	0.00	1.93	115.6	0.865E+00	3.04	27.67	.11389E+03
16.10	0.00	2.01	118.9	0.841E+00	3.23	27.69	.12101E+03
17.05	0.00	2.09	122.1	0.819E+00	3.42	27.70	.12812E+03
17.99	0.00	2.18	125.2	0.799E+00	3.61	27.72	.13524E+03
18.94	0.00	2.26	128.2	0.780E+00	3.80	27.73	.14236E+03
19.89	0.00	2.34	131.1	0.763E+00	3.99	27.75	.14948E+03
20.83	0.00	2.42	133.9	0.747E+00	4.18	27.76	.15660E+03
21.78	0.00	2.51	136.7	0.732E+00	4.37	27.78	.16371E+03
22.73	0.00	2.59	139.4	0.718E+00	4.55	27.79	.17083E+03
23.68	0.00	2.67	142.0	0.704E+00	4.74	27.81	.17795E+03
24.62	0.00	2.75	144.5	0.692E+00	4.93	27.82	.18507E+03
25.57	0.00	2.84	147.0	0.680E+00	5.12	27.84	.19219E+03
26.52	0.00	2.92	149.4	0.669E+00	5.31	27.85	.19930E+03
27.46	0.00	3.00	151.8	0.659E+00	5.50	27.87	.20642E+03
28.41	0.00	3.08	154.1	0.649E+00	5.69	27.88	.21354E+03
29.36	0.00	3.17	156.4	0.640E+00	5.88	27.90	.22066E+03
30.30	0.00	3.25	158.6	0.631E+00	6.07	27.91	.22778E+03
31.25	0.00	3.33	160.8	0.622E+00	6.26	27.93	.23489E+03
32.20	0.00	3.41	162.9	0.614E+00	6.44	27.94	.24201E+03
33.15	0.00	3.50	165.0	0.606E+00	6.63	27.96	.24913E+03
34.09	0.00	3.58	167.1	0.599E+00	6.82	27.97	.25625E+03
35.04	0.00	3.66	169.1	0.591E+00	7.01	27.99	.26337E+03
35.99	0.00	3.74	171.1	0.585E+00	7.20	28.00	.27048E+03
36.93	0.00	3.83	173.0	0.578E+00	7.39	28.02	.27760E+03
37.88	0.00	3.91	175.0	0.572E+00	7.58	28.03	.28472E+03
38.83	0.00	3.99	176.9	0.565E+00	7.77	28.05	.29184E+03
39.77	0.00	4.07	178.7	0.560E+00	7.96	28.06	.29895E+03
40.72	0.00	4.16	180.5	0.554E+00	8.15	28.08	.30607E+03
41.67	0.00	4.24	182.4	0.548E+00	8.34	28.09	.31319E+03
42.61	0.00	4.32	184.1	0.543E+00	8.52	28.11	.32031E+03
43.56	0.00	4.40	185.9	0.538E+00	8.71	28.12	.32743E+03
44.51	0.00	4.49	187.6	0.533E+00	8.90	28.14	.33454E+03
45.46	0.00	4.57	189.3	0.528E+00	9.09	28.15	.34166E+03
46.40	0.00	4.65	191.0	0.524E+00	9.28	28.17	.34878E+03
47.35	0.00	4.73	192.6	0.519E+00	9.47	28.18	.35590E+03

Cumulative travel time = 355.8986 sec (0.10 hrs)

Plume centerline may exhibit slight discontinuities in transition to subsequent far-field module.

END OF MOD277: UNSTABLE NEAR-FIELD ZONE OF ALTERNATING PERPENDICULAR DIFFUSER

** End of NEAR-FIELD REGION (NFR) **

BEGIN MOD241: BUOYANT AMBIENT SPREADING

Profile definitions:

BV = top-hat thickness, measured vertically
 BH = top-hat half-width, measured horizontally in y-direction
 ZU = upper plume boundary (Z-coordinate)
 ZL = lower plume boundary (Z-coordinate)
 S = hydrodynamic average (bulk) dilution
 C = average (bulk) concentration (includes reaction effects, if any)
 TT = Cumulative travel time

Plume Stage 1 (not bank attached):

	X	Y	Z	S	C	BV	BH	ZU	ZL	TT
E+03	47.35	0.00	9.47	192.4	0.520E+00	9.47	28.18	9.47	0.00	.35590
** REGULATORY MIXING ZONE BOUNDARY **										
In this prediction interval the plume DOWNSTREAM distance meets or exceeds the regulatory value = 67.06 m. This is the extent of the REGULATORY MIXING ZONE.										
E+03	98.29	0.00	9.47	197.1	0.507E+00	7.50	38.73	9.47	1.97	.55259
E+03	149.24	0.00	9.47	201.8	0.496E+00	6.43	47.98	9.47	3.04	.74929
E+03	200.18	0.00	9.47	207.6	0.482E+00	5.76	56.40	9.47	3.71	.94598
E+03	251.13	0.00	9.47	214.9	0.465E+00	5.29	64.22	9.47	4.18	.11427
E+04	302.07	0.00	9.47	223.7	0.447E+00	4.95	71.59	9.47	4.52	.13394
E+04	353.01	0.00	9.47	233.9	0.428E+00	4.70	78.60	9.47	4.77	.15361
E+04	403.96	0.00	9.47	245.5	0.407E+00	4.51	85.30	9.47	4.96	.17328
E+04	454.90	0.00	9.47	258.4	0.387E+00	4.38	91.74	9.47	5.09	.19295
E+04	505.85	0.00	9.47	272.6	0.367E+00	4.27	97.96	9.47	5.20	.21262
E+04	556.79	0.00	9.47	288.1	0.347E+00	4.20	103.98	9.47	5.27	.23229
E+04	607.74	0.00	9.47	304.9	0.328E+00	4.16	109.83	9.47	5.31	.25195
E+04	658.68	0.00	9.47	323.0	0.310E+00	4.13	115.53	9.47	5.34	.27162
E+04	709.62	0.00	9.47	342.3	0.292E+00	4.12	121.08	9.47	5.35	.29129
E+04	760.57	0.00	9.47	363.0	0.275E+00	4.13	126.51	9.47	5.34	.31096
E+04	811.51	0.00	9.47	384.9	0.260E+00	4.15	131.82	9.47	5.32	.33063
E+04	862.46	0.00	9.47	408.1	0.245E+00	4.19	137.03	9.47	5.28	.35030
E+04	913.40	0.00	9.47	432.7	0.231E+00	4.24	142.13	9.47	5.23	.36997
E+04	964.34	0.00	9.47	458.5	0.218E+00	4.29	147.15	9.47	5.18	.38964
E+04	1015.29	0.00	9.47	485.6	0.206E+00	4.36	152.08	9.47	5.11	.40931
E+04	1066.23	0.00	9.47	514.1	0.195E+00	4.44	156.93	9.47	5.03	.42898
E+04	1117.18	0.00	9.47	544.0	0.184E+00	4.52	161.71	9.47	4.95	.44865
E+04	1168.12	0.00	9.47	575.1	0.174E+00	4.62	166.41	9.47	4.85	.46832
E+04	1219.06	0.00	9.47	607.7	0.165E+00	4.72	171.05	9.47	4.75	.48799

CORMIX prediction has been TERMINATED at last prediction interval.
Limiting distance due to TIDAL REVERSAL has been reached.

END OF MOD241: BUOYANT AMBIENT SPREADING

[illegible]

 BEGIN MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY

UPSTREAM INTRUSION PROPERTIES:

Upstream intrusion length	=	1.11 m
X-position of upstream stagnation point	=	3.45 m
Thickness in intrusion region	=	9.31 m
Half-width at downstream end	=	31.43 m
Thickness at downstream end	=	8.67 m

Control volume inflow:

X	Y	Z	S	C	BV	BH	TT
4.56	0.00	4.66	167.4	0.597E+00	9.31	50.71	.00000E+00

** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **

The pollutant concentration in the plume falls below water quality standard or CCC value of 0.100E+01 due to mixing in this control volume.

The actual extent of the zone at whose boundary the water quality standard or the CCC is exceeded will be smaller than the control volume outflow values predicted below.

Profile definitions:

BV = top-hat thickness, measured vertically
 BH = top-hat half-width, measured horizontally in y-direction
 ZU = upper plume boundary (Z-coordinate)
 ZL = lower plume boundary (Z-coordinate)
 S = hydrodynamic average (bulk) dilution
 C = average (bulk) concentration (includes reaction effects, if any)
 TT = Cumulative travel time

	X	Y	Z	S	C	BV	BH	ZU	ZL	TT
	3.45	0.00	9.31	9837.4	0.000E+00	0.00	0.00	9.31	9.31	.75180
E+02	3.78	0.00	9.31	245.7	0.407E+00	9.31	27.93	9.31	0.00	.00000
E+00	5.43	0.00	9.31	166.3	0.601E+00	8.67	44.08	9.31	0.64	.41933
E+01	7.08	0.00	9.31	166.4	0.601E+00	8.67	41.75	9.31	0.64	.12081
E+02	8.73	0.00	9.31	166.7	0.600E+00	8.67	39.90	9.31	0.64	.19968
E+02	10.38	0.00	9.31	167.1	0.598E+00	8.67	38.33	9.31	0.64	.27856
E+02	12.03	0.00	9.31	167.5	0.597E+00	8.67	36.94	9.31	0.64	.35743
E+02	13.68	0.00	9.31	167.8	0.596E+00	8.67	35.67	9.31	0.64	.43631
E+02	15.32	0.00	9.31	167.9	0.596E+00	8.67	34.51	9.31	0.64	.51518
E+02	16.97	0.00	9.31	167.8	0.596E+00	8.67	33.42	9.31	0.64	.59405
E+02	18.62	0.00	9.31	167.6	0.597E+00	8.67	32.39	9.31	0.64	.67293
E+02	20.27	0.00	9.31	167.4	0.597E+00	8.67	31.43	9.31	0.64	.75180
E+02										
	Cumulative travel time = 75.1804 sec (0.02 hrs)									

END OF MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY

 ** End of NEAR-FIELD REGION (NFR) **

[illegible]

```

Momentum fluxes:  m0      =0.6840E-02  M0      =0.3753E+00
lQ=B   =      0.021  lM   =      0.46  lm   =      0.53  lmp   = 99999.00
LQ     =      0.484  LM   =      1.52  Lm   =      5.37  Lmp   = 99999.00
Properties of riser group with 1 ports/nozzles each:
U0     =      0.571  D0   =      0.303  A0   =      0.072  THETA =      90.00
FR0    =      10.13  FRD0  =      2.67  R    =      5.01
(slot)      (riser group)

```


BEGIN MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY

UPSTREAM INTRUSION PROPERTIES:

Upstream intrusion length	=	6.93 m
X-position of upstream stagnation point	=	-2.37 m
Thickness in intrusion region	=	8.05 m
Half-width at downstream end	=	37.72 m
Thickness at downstream end	=	7.95 m

Control volume inflow:

X	Y	Z	S	C	BV	BH	TT
4.56	0.00	4.59	98.6	0.101E+01	9.19	50.41	.00000E+00

Profile definitions:

BV = top-hat thickness, measured vertically
 BH = top-hat half-width, measured horizontally in y-direction
 ZU = upper plume boundary (Z-coordinate)
 ZL = lower plume boundary (Z-coordinate)
 S = hydrodynamic average (bulk) dilution
 C = average (bulk) concentration (includes reaction effects, if any)
 TT = Cumulative travel time

	X	Y	Z	S	C	BV	BH	ZU	ZL	TT
	-2.37	0.00	9.19	9916.8	0.000E+00	0.00	0.00	9.19	9.19	.16544
E+03	-1.85	0.00	9.19	288.0	0.347E+00	2.75	13.76	9.19	6.44	.00000
E+00	0.67	0.00	9.19	123.3	0.811E+00	6.43	33.41	9.19	2.76	.00000
E+00	3.20	0.00	9.19	100.7	0.993E+00	7.86	45.20	9.19	1.33	.00000
E+00	5.73	0.00	9.19	98.3	0.102E+01	8.05	43.30	9.19	1.14	.10274
E+02	8.26	0.00	9.19	98.8	0.101E+01	8.04	42.26	9.19	1.15	.32441
E+02	10.78	0.00	9.19	99.7	0.100E+01	8.02	41.35	9.19	1.17	.54608
E+02										

** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **

The pollutant concentration in the plume falls below water quality standard or CCC value of 0.100E+01 in the current prediction interval.

This is the spatial extent of concentrations exceeding the water quality standard or CCC value.

	13.31	0.00	9.19	100.6	0.994E+00	8.00	40.52	9.19	1.19	.76775
E+02	15.84	0.00	9.19	101.3	0.987E+00	7.98	39.75	9.19	1.21	.98942
E+02	18.36	0.00	9.19	101.8	0.983E+00	7.97	39.03	9.19	1.22	.12111
E+03	20.89	0.00	9.19	101.9	0.981E+00	7.96	38.36	9.19	1.23	.14328
E+03	23.42	0.00	9.19	102.0	0.981E+00	7.95	37.72	9.19	1.24	.16544
E+03										

Cumulative travel time = 165.4420 sec (0.05 hrs)

END OF MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY

** End of NEAR-FIELD REGION (NFR) **

BEGIN MOD241: BUOYANT AMBIENT SPREADING

[illegible]

22

X	Y	Z	S	C	BV	BH	Uc	TT
Individual	jet/plumes	before	merging:					
0.00	0.00	2.10	1.0	0.100E+03	0.15	0.15	1.265	.000000E+00
0.00	0.00	2.10	1.0	0.100E+03	0.15	0.15	0.807	.56970E-02
0.00	0.00	2.23	1.0	0.100E+03	0.16	0.16	0.782	.16201E+00
0.00	0.00	2.35	1.1	0.934E+02	0.18	0.18	0.761	.32290E+00
0.00	0.00	2.48	1.2	0.837E+02	0.19	0.19	0.742	.48808E+00
0.00	0.00	2.60	1.3	0.752E+02	0.20	0.20	0.724	.66366E+00
0.00	0.00	2.73	1.5	0.682E+02	0.21	0.21	0.709	.83688E+00
0.00	0.00	2.85	1.6	0.622E+02	0.23	0.23	0.695	.10138E+01
0.00	0.00	2.98	1.8	0.570E+02	0.24	0.24	0.682	.11941E+01
0.00	0.00	3.10	1.9	0.524E+02	0.25	0.25	0.669	.13847E+01
0.00	0.00	3.23	2.1	0.484E+02	0.26	0.26	0.658	.15717E+01
0.00	0.00	3.35	2.2	0.449E+02	0.28	0.28	0.648	.17619E+01
0.00	0.00	3.48	2.4	0.418E+02	0.29	0.29	0.638	.19550E+01
0.00	0.00	3.61	2.6	0.389E+02	0.30	0.30	0.628	.21583E+01

0.00	0.00	3.73	2.7	0.364E+02	0.31	0.31	0.620	.23572E+01
0.00	0.00	3.85	2.9	0.341E+02	0.33	0.33	0.611	.25589E+01
0.00	0.00	3.98	3.1	0.320E+02	0.34	0.34	0.603	.27708E+01
0.00	0.00	4.11	3.3	0.302E+02	0.35	0.35	0.596	.29777E+01
0.00	0.00	4.23	3.5	0.285E+02	0.36	0.36	0.589	.31872E+01
0.00	0.00	4.35	3.7	0.270E+02	0.38	0.38	0.582	.33991E+01
0.00	0.00	4.48	3.9	0.255E+02	0.39	0.39	0.576	.36214E+01
0.00	0.00	4.61	4.1	0.242E+02	0.40	0.40	0.570	.38381E+01
0.00	0.00	4.73	4.3	0.231E+02	0.41	0.41	0.564	.40570E+01
0.00	0.00	4.86	4.6	0.220E+02	0.43	0.43	0.558	.42782E+01
0.00	0.00	4.98	4.8	0.209E+02	0.44	0.44	0.553	.45100E+01
0.00	0.00	5.11	5.0	0.200E+02	0.45	0.45	0.547	.47356E+01
0.00	0.00	5.23	5.2	0.191E+02	0.46	0.46	0.542	.49633E+01
0.00	0.00	5.36	5.5	0.183E+02	0.47	0.47	0.538	.51930E+01
0.00	0.00	5.48	5.7	0.175E+02	0.49	0.49	0.533	.54335E+01
0.00	0.00	5.61	6.0	0.168E+02	0.50	0.50	0.528	.56673E+01
0.00	0.00	5.73	6.2	0.161E+02	0.51	0.51	0.524	.59031E+01
0.00	0.00	5.86	6.5	0.155E+02	0.52	0.52	0.520	.61497E+01
0.00	0.00	5.99	6.7	0.149E+02	0.54	0.54	0.516	.63893E+01
0.00	0.00	6.11	7.0	0.143E+02	0.55	0.55	0.512	.66309E+01
0.00	0.00	6.23	7.2	0.138E+02	0.56	0.56	0.508	.68742E+01
0.00	0.00	6.36	7.5	0.133E+02	0.57	0.57	0.504	.71285E+01
0.00	0.00	6.49	7.8	0.129E+02	0.59	0.59	0.501	.73755E+01
0.00	0.00	6.61	8.1	0.124E+02	0.60	0.60	0.497	.76242E+01
0.00	0.00	6.73	8.3	0.120E+02	0.61	0.61	0.494	.78747E+01
0.00	0.00	6.86	8.6	0.116E+02	0.62	0.62	0.490	.81362E+01
0.00	0.00	6.99	8.9	0.112E+02	0.64	0.64	0.487	.83901E+01
0.00	0.00	7.11	9.2	0.109E+02	0.65	0.65	0.484	.86457E+01
0.00	0.00	7.24	9.5	0.105E+02	0.66	0.66	0.481	.89029E+01
0.00	0.00	7.36	9.8	0.102E+02	0.67	0.67	0.478	.91713E+01

** CMC HAS BEEN FOUND **

The pollutant concentration in the plume falls below CMC value of 0.100E+02 in the current prediction interval.

This is the extent of the TOXIC DILUTION ZONE.

0.00	0.00	7.49	10.1	0.991E+01	0.69	0.69	0.475	.94317E+01
0.00	0.00	7.61	10.4	0.962E+01	0.70	0.70	0.472	.96937E+01
0.00	0.00	7.74	10.7	0.935E+01	0.71	0.71	0.469	.99573E+01
0.00	0.00	7.87	11.0	0.908E+01	0.72	0.72	0.467	.10232E+02
0.00	0.00	7.99	11.3	0.883E+01	0.74	0.74	0.464	.10499E+02
0.00	0.00	8.11	11.6	0.859E+01	0.75	0.75	0.461	.10767E+02
0.00	0.00	8.24	12.0	0.835E+01	0.76	0.76	0.459	.11047E+02
0.00	0.00	8.37	12.3	0.813E+01	0.77	0.77	0.456	.11311E+02

Cumulative travel time = 11.3111 sec (0.00 hrs)

Merging of individual jet/plumes not found in this module, but interaction will occur in following module. Overall jet/plume interaction dimensions:

0.00	0.00	8.37	12.3	0.813E+01	0.77	27.58	0.456	.11311E+02
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END OF CORJET (MOD110): JET/PLUME NEAR-FIELD MIXING REGION

BEGIN MOD232: LAYER BOUNDARY IMPINGEMENT/UPSTREAM SPREADING

Vertical angle of layer/boundary impingement = 90.00 deg
Horizontal angle of layer/boundary impingement = 0.00 deg

Discharge into STAGNANT AMBIENT environment:

STEADY-STATE MIXING CONDITION IS NOT POSSIBLE in this zone, even though some ADDITIONAL DILUTION MAY OCCUR!

Also, all far-field processes will be UNSTEADY.

SIMULATION STOPS because of stagnant ambient conditions.

END OF MOD232: LAYER BOUNDARY IMPINGEMENT/UPSTREAM SPREADING


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Momentum fluxes:      m0      =0.6840E-02  M0      =0.3753E+00
lQ=B      =      0.021  lM      =      0.46  lm      =      0.40  lmp      = 99999.00
LQ      =      0.484  LM      =      1.52  Lm      =      4.71  Lmp      = 99999.00
Properties of riser group with 1 ports/nozzles each:
U0      =      0.571  D0      =      0.303  A0      =      0.072  THETA =      90.00
FR0      =      10.13  FRD0     =      2.67  R      =      4.39
(slot)      (riser group)

```


BEGIN MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY

UPSTREAM INTRUSION PROPERTIES:

Upstream intrusion length	=	4.34 m
X-position of upstream stagnation point	=	0.22 m
Thickness in intrusion region	=	9.18 m
Half-width at downstream end	=	35.46 m
Thickness at downstream end	=	8.16 m

Control volume inflow:

X	Y	Z	S	C	BV	BH	TT
4.56	0.00	4.59	106.0	0.943E+00	9.18	50.38	.00000E+00

** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **

The pollutant concentration in the plume falls below water quality standard or CCC value of 0.100E+01 due to mixing in this control volume.

The actual extent of the zone at whose boundary the water quality standard or the CCC is exceeded will be smaller than the control volume outflow values predicted below.

Profile definitions:

BV = top-hat thickness, measured vertically
 BH = top-hat half-width, measured horizontally in y-direction
 ZU = upper plume boundary (Z-coordinate)
 ZL = lower plume boundary (Z-coordinate)
 S = hydrodynamic average (bulk) dilution
 C = average (bulk) concentration (includes reaction effects, if any)
 TT = Cumulative travel time

	X	Y	Z	S	C	BV	BH	ZU	ZL	TT
	0.22	0.00	9.18	9494.5	0.000E+00	0.00	0.00	9.18	9.18	.13637
E+03	0.66	0.00	9.18	262.0	0.382E+00	4.59	16.06	9.18	4.59	.00000
E+00	2.82	0.00	9.18	115.9	0.863E+00	9.18	39.02	9.18	0.00	.00000
E+00	4.98	0.00	9.18	103.8	0.963E+00	8.16	43.45	9.18	1.02	.32742
E+01	7.15	0.00	9.18	103.5	0.966E+00	8.16	42.02	9.18	1.02	.19912
E+02	9.31	0.00	9.18	103.5	0.967E+00	8.16	40.80	9.18	1.02	.36549
E+02	11.47	0.00	9.18	103.5	0.966E+00	8.16	39.72	9.18	1.02	.53187
E+02	13.63	0.00	9.18	103.4	0.967E+00	8.16	38.74	9.18	1.02	.69824
E+02	15.80	0.00	9.18	103.1	0.970E+00	8.83	37.84	9.18	0.35	.86462
E+02	17.96	0.00	9.18	102.6	0.975E+00	8.50	37.00	9.18	0.68	.10310
E+03	20.12	0.00	9.18	101.9	0.981E+00	8.31	36.21	9.18	0.87	.11974
E+03	22.29	0.00	9.18	101.2	0.988E+00	8.16	35.46	9.18	1.02	.13637

Cumulative travel time = 136.3747 sec (0.04 hrs)

END OF MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY

 ** End of NEAR-FIELD REGION (NFR) **

Profile definitions:

Plume Stage 1 (not bank attached):

** REGULATORY MIXING ZONE BOUNDARY **

This is the extent of the REGULATORY MIXING ZONE.

CORMIX prediction has been TERMINATED at last prediction interval.

END OF MOD241: BUOYANT AMBIENT SPREADING

[illegible]

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Momentum fluxes:      m0      =0.6840E-02  M0      =0.3753E+00
lQ=B      =      0.021  lM      =      0.46  lm      =      0.13  lmp      = 99999.00
LQ      =      0.484  LM      =      1.52  Lm      =      2.68  Lmp      = 99999.00
Properties of riser group with 1 ports/nozzles each:
U0      =      0.571  D0      =      0.303  A0      =      0.072  THETA =      90.00
FR0      =      10.13  FRD0     =      2.67  R      =      2.49
(slot)      (riser group)

```

This is the extent of the TOXIC DILUTION ZONE.

0.93	0.00	0.69	26.7	0.375E+01	0.20	27.45	.78401E+01
1.86	0.00	0.77	37.1	0.269E+01	0.39	27.47	.15680E+02
2.79	0.00	0.85	45.1	0.222E+01	0.57	27.49	.23520E+02
3.72	0.00	0.93	51.6	0.194E+01	0.76	27.51	.31361E+02
4.64	0.00	1.01	57.3	0.174E+01	0.94	27.53	.39201E+02
5.57	0.00	1.09	62.4	0.160E+01	1.13	27.55	.47041E+02
6.50	0.00	1.17	67.0	0.149E+01	1.31	27.57	.54881E+02
7.43	0.00	1.26	71.2	0.140E+01	1.50	27.59	.62721E+02
8.36	0.00	1.34	75.2	0.133E+01	1.69	27.60	.70561E+02
9.29	0.00	1.42	78.8	0.127E+01	1.87	27.62	.78401E+02
10.22	0.00	1.50	82.2	0.122E+01	2.06	27.64	.86241E+02
11.15	0.00	1.58	85.5	0.117E+01	2.24	27.66	.94082E+02
12.08	0.00	1.66	88.5	0.113E+01	2.43	27.68	.10192E+03
13.01	0.00	1.74	91.4	0.109E+01	2.61	27.70	.10976E+03
13.93	0.00	1.82	94.2	0.106E+01	2.80	27.72	.11760E+03
14.86	0.00	1.90	96.9	0.103E+01	2.98	27.74	.12544E+03
15.79	0.00	1.98	99.4	0.101E+01	3.17	27.76	.13328E+03

** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **

The pollutant concentration in the plume falls below water quality standard or CCC value of 0.100E+01 in the current prediction interval.

This is the spatial extent of concentrations exceeding the water quality standard or CCC value.

16.72	0.00	2.06	101.8	0.982E+00	3.36	27.78	.14112E+03
17.65	0.00	2.14	104.2	0.960E+00	3.54	27.80	.14896E+03
18.58	0.00	2.22	106.4	0.940E+00	3.73	27.81	.15680E+03
19.51	0.00	2.30	108.6	0.921E+00	3.91	27.83	.16464E+03
20.44	0.00	2.39	110.7	0.903E+00	4.10	27.85	.17248E+03
21.37	0.00	2.47	112.7	0.887E+00	4.28	27.87	.18032E+03
22.30	0.00	2.55	114.7	0.872E+00	4.47	27.89	.18816E+03
23.23	0.00	2.63	116.6	0.858E+00	4.65	27.91	.19600E+03
24.15	0.00	2.71	118.4	0.844E+00	4.84	27.93	.20384E+03
25.08	0.00	2.79	120.2	0.832E+00	5.02	27.95	.21168E+03
26.01	0.00	2.87	121.9	0.820E+00	5.21	27.97	.21952E+03
26.94	0.00	2.95	123.6	0.809E+00	5.40	27.99	.22736E+03
27.87	0.00	3.03	125.3	0.798E+00	5.58	28.01	.23520E+03
28.80	0.00	3.11	126.9	0.788E+00	5.77	28.03	.24304E+03
29.73	0.00	3.19	128.5	0.778E+00	5.95	28.04	.25088E+03
30.66	0.00	3.27	130.0	0.769E+00	6.14	28.06	.25872E+03
31.59	0.00	3.35	131.5	0.761E+00	6.32	28.08	.26656E+03
32.52	0.00	3.43	132.9	0.752E+00	6.51	28.10	.27440E+03
33.44	0.00	3.52	134.3	0.744E+00	6.69	28.12	.28224E+03
34.37	0.00	3.60	135.7	0.737E+00	6.88	28.14	.29008E+03
35.30	0.00	3.68	137.1	0.729E+00	7.06	28.16	.29793E+03
36.23	0.00	3.76	138.4	0.722E+00	7.25	28.18	.30577E+03
37.16	0.00	3.84	139.7	0.716E+00	7.44	28.20	.31361E+03
38.09	0.00	3.92	141.0	0.709E+00	7.62	28.22	.32145E+03
39.02	0.00	4.00	142.3	0.703E+00	7.81	28.24	.32929E+03
39.95	0.00	4.08	143.5	0.697E+00	7.99	28.25	.33713E+03
40.88	0.00	4.16	144.7	0.691E+00	8.18	28.27	.34497E+03
41.81	0.00	4.24	145.9	0.685E+00	8.36	28.29	.35281E+03
42.73	0.00	4.32	147.0	0.680E+00	8.55	28.31	.36065E+03
43.66	0.00	4.40	148.2	0.675E+00	8.73	28.33	.36849E+03
44.59	0.00	4.48	149.3	0.670E+00	8.92	28.35	.37633E+03
45.52	0.00	4.56	150.4	0.665E+00	9.10	28.37	.38417E+03
46.45	0.00	4.64	151.5	0.660E+00	9.29	28.39	.39201E+03

Cumulative travel time = 392.0064 sec (0.11 hrs)

Plume centerline may exhibit slight discontinuities in transition to subsequent far-field module.

END OF MOD277: UNSTABLE NEAR-FIELD ZONE OF ALTERNATING PERPENDICULAR DIFFUSER

** End of NEAR-FIELD REGION (NFR) **

[illegible]

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Momentum fluxes:  m0      =0.6840E-02  M0      =0.3753E+00
lQ=B      =      0.021  lM      =      0.46  lm      =      0.11  lmp      = 99999.00
LQ      =      0.484  LM      =      1.52  Lm      =      2.40  Lmp      = 99999.00
Properties of riser group with 1 ports/nozzles each:
U0      =      0.571  D0      =      0.303  A0      =      0.072  THETA =      90.00
FR0      =      10.13  FRD0     =      2.67  R      =      2.24
(slot)      (riser group)

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0.94	0.00	0.69	30.0	0.334E+01	0.21	27.45	.72084E+01
1.89	0.00	0.77	41.8	0.239E+01	0.39	27.46	.14417E+02
2.84	0.00	0.86	50.8	0.197E+01	0.58	27.48	.21625E+02
3.78	0.00	0.94	58.2	0.172E+01	0.77	27.49	.28833E+02
4.72	0.00	1.02	64.7	0.155E+01	0.96	27.51	.36042E+02
5.67	0.00	1.10	70.5	0.142E+01	1.15	27.52	.43250E+02
6.62	0.00	1.19	75.8	0.132E+01	1.34	27.54	.50459E+02
7.56	0.00	1.27	80.6	0.124E+01	1.53	27.56	.57667E+02
8.51	0.00	1.35	85.1	0.117E+01	1.71	27.57	.64875E+02
9.45	0.00	1.43	89.3	0.112E+01	1.90	27.59	.72084E+02
10.39	0.00	1.51	93.3	0.107E+01	2.09	27.60	.79292E+02
11.34	0.00	1.60	97.0	0.103E+01	2.28	27.62	.86500E+02

** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **

The pollutant concentration in the plume falls below water quality standard or CCC value of 0.100E+01 in the current prediction interval.

This is the spatial extent of concentrations exceeding the water quality standard or CCC value.

12.28	0.00	1.68	100.6	0.994E+00	2.47	27.63	.93709E+02
13.23	0.00	1.76	104.0	0.962E+00	2.66	27.65	.10092E+03
14.17	0.00	1.84	107.2	0.933E+00	2.85	27.66	.10813E+03
15.12	0.00	1.93	110.3	0.907E+00	3.04	27.68	.11533E+03
16.06	0.00	2.01	113.2	0.883E+00	3.22	27.70	.12254E+03
17.01	0.00	2.09	116.1	0.861E+00	3.41	27.71	.12975E+03
17.95	0.00	2.17	118.8	0.842E+00	3.60	27.73	.13696E+03
18.90	0.00	2.26	121.5	0.823E+00	3.79	27.74	.14417E+03
19.84	0.00	2.34	124.0	0.806E+00	3.98	27.76	.15138E+03
20.79	0.00	2.42	126.5	0.791E+00	4.17	27.77	.15858E+03
21.73	0.00	2.50	128.9	0.776E+00	4.36	27.79	.16579E+03
22.68	0.00	2.58	131.2	0.762E+00	4.54	27.80	.17300E+03
23.62	0.00	2.67	133.4	0.750E+00	4.73	27.82	.18021E+03
24.57	0.00	2.75	135.6	0.738E+00	4.92	27.83	.18742E+03
25.51	0.00	2.83	137.7	0.726E+00	5.11	27.85	.19463E+03
26.46	0.00	2.91	139.8	0.715E+00	5.30	27.87	.20183E+03
27.40	0.00	3.00	141.8	0.705E+00	5.49	27.88	.20904E+03
28.35	0.00	3.08	143.7	0.696E+00	5.68	27.90	.21625E+03
29.29	0.00	3.16	145.6	0.687E+00	5.87	27.91	.22346E+03
30.24	0.00	3.24	147.5	0.678E+00	6.05	27.93	.23067E+03
31.18	0.00	3.33	149.3	0.670E+00	6.24	27.94	.23788E+03
32.13	0.00	3.41	151.1	0.662E+00	6.43	27.96	.24508E+03
33.07	0.00	3.49	152.8	0.654E+00	6.62	27.97	.25229E+03
34.02	0.00	3.57	154.5	0.647E+00	6.81	27.99	.25950E+03
34.96	0.00	3.65	156.2	0.640E+00	7.00	28.00	.26671E+03
35.91	0.00	3.74	157.8	0.634E+00	7.19	28.02	.27392E+03
36.85	0.00	3.82	159.4	0.627E+00	7.37	28.04	.28113E+03
37.80	0.00	3.90	160.9	0.621E+00	7.56	28.05	.28833E+03
38.74	0.00	3.98	162.5	0.616E+00	7.75	28.07	.29554E+03
39.69	0.00	4.07	164.0	0.610E+00	7.94	28.08	.30275E+03
40.63	0.00	4.15	165.4	0.605E+00	8.13	28.10	.30996E+03
41.58	0.00	4.23	166.9	0.599E+00	8.32	28.11	.31717E+03
42.52	0.00	4.31	168.3	0.594E+00	8.51	28.13	.32438E+03
43.47	0.00	4.40	169.7	0.589E+00	8.70	28.14	.33158E+03
44.41	0.00	4.48	171.0	0.585E+00	8.88	28.16	.33879E+03
45.36	0.00	4.56	172.4	0.580E+00	9.07	28.18	.34600E+03
46.30	0.00	4.64	173.7	0.576E+00	9.26	28.19	.35321E+03
47.25	0.00	4.72	175.0	0.571E+00	9.45	28.21	.36042E+03

Cumulative travel time = 360.4185 sec (0.10 hrs)

Plume centerline may exhibit slight discontinuities in transition to subsequent far-field module.

END OF MOD277: UNSTABLE NEAR-FIELD ZONE OF ALTERNATING PERPENDICULAR DIFFUSER

** End of NEAR-FIELD REGION (NFR) **

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Momentum fluxes:  m0      =0.6840E-02  M0      =0.3753E+00
LQ=B   =      0.021  lM    =      0.46   lm     =      0.24   lmp   = 99999.00
LQ     =      0.484  LM    =      1.52   Lm     =      3.62   Lmp   = 99999.00
Properties of riser group with 1 ports/nozzles each:
U0     =      0.571  D0     =      0.303  A0     =      0.072  THETA =      90.00
FR0    =      10.13  FRD0   =      2.67   R      =      3.38
(slot)      (riser group)

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END OF MOD234: UNSTABLE RECIRCULATION REGION OVER LAYER DEPTH

BEGIN MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY

UPSTREAM INTRUSION PROPERTIES:

Upstream intrusion length	=	2.06 m
X-position of upstream stagnation point	=	2.50 m
Thickness in intrusion region	=	9.66 m
Half-width at downstream end	=	33.09 m
Thickness at downstream end	=	8.79 m

Control volume inflow:

X	Y	Z	S	C	BV	BH	TT
4.56	0.00	4.83	143.5	0.697E+00	9.66	51.58	.00000E+00

** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **

The pollutant concentration in the plume falls below water quality standard or CCC value of 0.100E+01 due to mixing in this control volume.

The actual extent of the zone at whose boundary the water quality standard or the CCC is exceeded will be smaller than the control volume outflow values predicted below.

Profile definitions:

BV = top-hat thickness, measured vertically
BH = top-hat half-width, measured horizontally in y-direction
ZU = upper plume boundary (Z-coordinate)
ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic average (bulk) dilution
C = average (bulk) concentration (includes reaction effects, if any)
TT = Cumulative travel time

	X	Y	Z	S	C	BV	BH	ZU	ZL	TT
	2.50	0.00	9.66	9858.2	0.000E+00	0.00	0.00	9.66	9.66	.97891
E+02										
	2.87	0.00	9.66	270.0	0.370E+00	9.66	21.92	9.66	0.00	.00000
E+00										
	4.69	0.00	9.66	142.7	0.701E+00	8.79	45.23	9.66	0.87	.79722
E+00										
	6.51	0.00	9.66	142.8	0.700E+00	8.79	42.99	9.66	0.87	.11585
E+02										
	8.34	0.00	9.66	143.2	0.698E+00	8.79	41.22	9.66	0.87	.22374
E+02										
	10.16	0.00	9.66	143.8	0.696E+00	8.79	39.71	9.66	0.87	.33162
E+02										
	11.98	0.00	9.66	144.3	0.693E+00	8.79	38.37	9.66	0.87	.43950
E+02										
	13.81	0.00	9.66	144.8	0.691E+00	8.79	37.16	9.66	0.87	.54738
E+02										
	15.63	0.00	9.66	145.1	0.689E+00	8.79	36.04	9.66	0.87	.65526
E+02										
	17.45	0.00	9.66	145.1	0.689E+00	8.79	35.00	9.66	0.87	.76314
E+02										
	19.28	0.00	9.66	145.0	0.689E+00	9.49	34.02	9.66	0.17	.87102
E+02										
	21.10	0.00	9.66	144.9	0.690E+00	8.79	33.09	9.66	0.87	.97891
E+02										

Cumulative travel time = 97.8906 sec (0.03 hrs)

END OF MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY

** End of NEAR-FIELD REGION (NFR) **

[illegible]

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Momentum fluxes:  m0  =0.6840E-02  M0  =0.3753E+00
lQ=B  =      0.021  lM  =      0.46  lm  =      2.44  lmp  = 99999.00
LQ    =      0.484  LM  =      1.52  Lm  =     11.56  Lmp  = 99999.00
Properties of riser group with 1 ports/nozzles each:
U0    =      0.571  D0    =      0.303  A0    =      0.072  THETA =      90.00
FR0   =     10.13  FRD0  =      2.67  R     =     10.77
(slot)      (riser group)

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The pollutant concentration in the plume falls below CMC value of 0.100E+02
in the current prediction interval.

This is the extent of the TOXIC DILUTION ZONE.

7.41	0.00	3.41	10.8	0.925E+01	0.85	0.85	0.207	.22187E+02
8.27	0.00	3.49	12.0	0.831E+01	0.91	0.91	0.196	.25589E+02
9.13	0.00	3.57	13.3	0.753E+01	0.97	0.97	0.187	.29127E+02
9.99	0.00	3.66	14.6	0.687E+01	1.03	1.03	0.179	.32792E+02
10.85	0.00	3.73	15.9	0.630E+01	1.08	1.08	0.172	.36573E+02
11.71	0.00	3.81	17.2	0.581E+01	1.14	1.14	0.166	.40463E+02
12.57	0.00	3.89	18.6	0.539E+01	1.20	1.20	0.161	.44435E+02
13.43	0.00	3.97	20.0	0.501E+01	1.25	1.25	0.156	.48524E+02
14.29	0.00	4.04	21.4	0.467E+01	1.31	1.31	0.152	.52705E+02
15.15	0.00	4.12	22.9	0.437E+01	1.36	1.36	0.148	.56972E+02
16.01	0.00	4.19	24.4	0.411E+01	1.41	1.41	0.144	.61322E+02
16.87	0.00	4.26	25.9	0.387E+01	1.46	1.46	0.141	.65750E+02
17.73	0.00	4.34	27.4	0.365E+01	1.52	1.52	0.137	.70255E+02
18.59	0.00	4.41	29.0	0.345E+01	1.57	1.57	0.134	.74832E+02
19.45	0.00	4.48	30.6	0.327E+01	1.62	1.62	0.132	.79478E+02
20.31	0.00	4.55	32.2	0.311E+01	1.67	1.67	0.129	.84192E+02
21.18	0.00	4.62	33.9	0.295E+01	1.72	1.72	0.127	.88971E+02
22.04	0.00	4.69	35.5	0.281E+01	1.77	1.77	0.124	.93812E+02
22.90	0.00	4.76	37.2	0.269E+01	1.82	1.82	0.122	.98715E+02

Merging of individual jet/plumes to form plane jet/plume:

23.01	0.00	4.77	47.3	0.211E+01	2.29	29.72	0.086	.99378E+02
24.62	0.00	4.88	49.4	0.202E+01	2.39	29.83	0.086	.11096E+03
25.48	0.00	4.94	50.6	0.198E+01	2.45	29.88	0.086	.11717E+03
26.35	0.00	5.00	51.7	0.193E+01	2.50	29.94	0.086	.12337E+03
27.20	0.00	5.06	52.8	0.189E+01	2.56	29.99	0.086	.12954E+03
28.06	0.00	5.11	53.9	0.185E+01	2.61	30.05	0.087	.13573E+03
28.93	0.00	5.17	55.0	0.182E+01	2.67	30.10	0.087	.14193E+03
29.79	0.00	5.23	56.2	0.178E+01	2.72	30.16	0.087	.14812E+03
30.65	0.00	5.29	57.3	0.175E+01	2.78	30.21	0.087	.15432E+03
31.51	0.00	5.35	58.4	0.171E+01	2.83	30.27	0.087	.16051E+03
32.37	0.00	5.41	59.5	0.168E+01	2.89	30.32	0.087	.16670E+03
33.24	0.00	5.47	60.7	0.165E+01	2.94	30.38	0.087	.17289E+03
34.10	0.00	5.53	61.8	0.162E+01	3.00	30.43	0.087	.17907E+03
34.96	0.00	5.59	62.9	0.159E+01	3.05	30.49	0.087	.18526E+03
35.82	0.00	5.65	64.0	0.156E+01	3.11	30.54	0.087	.19141E+03
36.68	0.00	5.71	65.2	0.153E+01	3.16	30.60	0.087	.19759E+03
37.54	0.00	5.77	66.3	0.151E+01	3.22	30.65	0.087	.20377E+03
38.40	0.00	5.83	67.4	0.148E+01	3.27	30.71	0.087	.20995E+03
39.26	0.00	5.89	68.5	0.146E+01	3.33	30.76	0.087	.21613E+03
40.12	0.00	5.96	69.7	0.144E+01	3.38	30.82	0.087	.22230E+03
40.99	0.00	6.02	70.8	0.141E+01	3.44	30.87	0.087	.22848E+03
41.84	0.00	6.08	71.9	0.139E+01	3.49	30.93	0.087	.23462E+03
42.71	0.00	6.14	73.0	0.137E+01	3.55	30.98	0.087	.24078E+03

Cumulative travel time = 240.7810 sec (0.07 hrs)

END OF CORJET (MOD110): JET/PLUME NEAR-FIELD MIXING REGION

BEGIN MOD232: LAYER BOUNDARY IMPINGEMENT/UPSTREAM SPREADING

Vertical angle of layer/boundary impingement = 4.05 deg
Horizontal angle of layer/boundary impingement = 0.00 deg

UPSTREAM INTRUSION PROPERTIES:

Upstream intrusion length = 227.34 m
X-position of upstream stagnation point = -184.64 m
Thickness in intrusion region = 0.95 m
Half-width at downstream end = 334.31 m
Thickness at downstream end = 2.10 m

[illegible]

222

0.00	0.00	3.89	3.0	0.336E+02	0.33	0.33	0.609	.26116E+01
0.00	0.00	4.02	3.2	0.314E+02	0.34	0.34	0.601	.28395E+01
0.00	0.00	4.16	3.4	0.294E+02	0.36	0.36	0.593	.30705E+01
0.00	0.00	4.30	3.6	0.277E+02	0.37	0.37	0.585	.33046E+01
0.00	0.00	4.44	3.8	0.260E+02	0.38	0.38	0.578	.35417E+01
0.00	0.00	4.58	4.1	0.246E+02	0.40	0.40	0.571	.37817E+01
0.00	0.00	4.71	4.3	0.232E+02	0.41	0.41	0.565	.40245E+01
0.00	0.00	4.85	4.5	0.220E+02	0.42	0.42	0.558	.42700E+01
0.00	0.00	4.99	4.8	0.209E+02	0.44	0.44	0.552	.45183E+01
0.00	0.00	5.13	5.0	0.198E+02	0.45	0.45	0.547	.47692E+01
0.00	0.00	5.26	5.3	0.189E+02	0.47	0.47	0.541	.50226E+01
0.00	0.00	5.40	5.6	0.180E+02	0.48	0.48	0.536	.52787E+01
0.00	0.00	5.54	5.8	0.172E+02	0.49	0.49	0.531	.55371E+01
0.00	0.00	5.67	6.1	0.164E+02	0.51	0.51	0.526	.57893E+01
0.00	0.00	5.81	6.4	0.157E+02	0.52	0.52	0.521	.60526E+01
0.00	0.00	5.95	6.6	0.151E+02	0.53	0.53	0.517	.63181E+01
0.00	0.00	6.09	6.9	0.144E+02	0.55	0.55	0.513	.65860E+01
0.00	0.00	6.22	7.2	0.139E+02	0.56	0.56	0.508	.68561E+01
0.00	0.00	6.36	7.5	0.133E+02	0.57	0.57	0.504	.71285E+01
0.00	0.00	6.50	7.8	0.128E+02	0.59	0.59	0.500	.74030E+01
0.00	0.00	6.64	8.1	0.123E+02	0.60	0.60	0.496	.76797E+01
0.00	0.00	6.78	8.4	0.119E+02	0.62	0.62	0.493	.79586E+01
0.00	0.00	6.91	8.7	0.114E+02	0.63	0.63	0.489	.82395E+01
0.00	0.00	7.05	9.1	0.110E+02	0.64	0.64	0.485	.85224E+01
0.00	0.00	7.19	9.4	0.107E+02	0.66	0.66	0.482	.88074E+01
0.00	0.00	7.32	9.7	0.103E+02	0.67	0.67	0.479	.90848E+01

** CMC HAS BEEN FOUND **

The pollutant concentration in the plume falls below CMC value of 0.100E+02 in the current prediction interval.

This is the extent of the TOXIC DILUTION ZONE.

0.00	0.00	7.46	10.0	0.998E+01	0.68	0.68	0.476	.93737E+01
0.00	0.00	7.60	10.4	0.966E+01	0.70	0.70	0.472	.96645E+01
0.00	0.00	7.74	10.7	0.935E+01	0.71	0.71	0.469	.99573E+01
0.00	0.00	7.87	11.0	0.906E+01	0.72	0.72	0.466	.10252E+02
0.00	0.00	8.01	11.4	0.878E+01	0.74	0.74	0.464	.10548E+02
0.00	0.00	8.15	11.7	0.852E+01	0.75	0.75	0.461	.10847E+02
0.00	0.00	8.29	12.1	0.827E+01	0.77	0.77	0.458	.11147E+02
0.00	0.00	8.43	12.5	0.803E+01	0.78	0.78	0.455	.11449E+02
0.00	0.00	8.56	12.8	0.780E+01	0.79	0.79	0.453	.11753E+02
0.00	0.00	8.70	13.2	0.758E+01	0.81	0.81	0.450	.12058E+02
0.00	0.00	8.84	13.6	0.737E+01	0.82	0.82	0.447	.12365E+02
0.00	0.00	8.97	13.9	0.718E+01	0.83	0.83	0.445	.12664E+02

Cumulative travel time = 12.6640 sec (0.00 hrs)

Merging of individual jet/plumes not found in this module, but interaction will occur in following module. Overall jet/plume interaction dimensions:

0.00	0.00	8.97	13.9	0.718E+01	0.83	27.58	0.445	.12664E+02
------	------	------	------	-----------	------	-------	-------	------------

END OF CORJET (MOD110): JET/PLUME NEAR-FIELD MIXING REGION

BEGIN MOD232: LAYER BOUNDARY IMPINGEMENT/UPSTREAM SPREADING

Vertical angle of layer/boundary impingement = 90.00 deg
Horizontal angle of layer/boundary impingement = 0.00 deg

Discharge into STAGNANT AMBIENT environment:

STEADY-STATE MIXING CONDITION IS NOT POSSIBLE in this zone,
even though some ADDITIONAL DILUTION MAY OCCUR!

Also, all far-field processes will be UNSTEADY.

SIMULATION STOPS because of stagnant ambient conditions.

END OF MOD232: LAYER BOUNDARY IMPINGEMENT/UPSTREAM SPREADING


```

Momentum fluxes:  m0      =0.6840E-02  M0      =0.3753E+00
LQ=B   =      0.021 LM   =      0.46  lm   =      0.21  lmp   = 99999.00
LQ     =      0.484 LM   =      1.52  Lm   =      3.42  Lmp   = 99999.00
Properties of riser group with 1 ports/nozzles each:
UO     =      0.571 D0    =      0.303 AO    =      0.072 THETA =      90.00
FR0    =      10.13 FRD0  =      2.67  R     =      3.19
(slot)      (riser group)

```

END OF MOD234: UNSTABLE RECIRCULATION REGION OVER LAYER DEPTH

BEGIN MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY

UPSTREAM INTRUSION PROPERTIES:

Upstream intrusion length	=	1.74 m
X-position of upstream stagnation point	=	2.82 m
Thickness in intrusion region	=	9.78 m
Half-width at downstream end	=	32.65 m
Thickness at downstream end	=	8.95 m

Control volume inflow:

X	Y	Z	S	C	BV	BH	TT
4.56	0.00	4.89	147.2	0.679E+00	9.78	51.88	.00000E+00

** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **

The pollutant concentration in the plume falls below water quality standard or CCC value of 0.100E+01 due to mixing in this control volume.

The actual extent of the zone at whose boundary the water quality standard or the CCC is exceeded will be smaller than the control volume outflow values predicted below.

Profile definitions:

BV = top-hat thickness, measured vertically
BH = top-hat half-width, measured horizontally in y-direction
ZU = upper plume boundary (Z-coordinate)
ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic average (bulk) dilution
C = average (bulk) concentration (includes reaction effects, if any)
TT = Cumulative travel time

	X	Y	Z	S	C	BV	BH	ZU	ZL	TT
	2.82	0.00	9.78	9322.6	0.000E+00	0.00	0.00	9.78	9.78	.91192
E+02										
	3.18	0.00	9.78	253.9	0.394E+00	9.78	23.67	9.78	0.00	.00000
E+00										
	4.95	0.00	9.78	143.3	0.698E+00	8.95	45.27	9.78	0.83	.22068
E+01										
	6.72	0.00	9.78	142.7	0.701E+00	8.95	42.94	9.78	0.83	.12094
E+02										
	8.49	0.00	9.78	142.4	0.702E+00	8.95	41.10	9.78	0.83	.21981
E+02										
	10.26	0.00	9.78	142.2	0.703E+00	8.95	39.54	9.78	0.83	.31869
E+02										
	12.03	0.00	9.78	141.8	0.705E+00	8.95	38.15	9.78	0.83	.41756
E+02										
	13.80	0.00	9.78	141.4	0.707E+00	8.95	36.88	9.78	0.83	.51643
E+02										
	15.57	0.00	9.78	140.7	0.711E+00	8.95	35.72	9.78	0.83	.61530
E+02										
	17.34	0.00	9.78	139.9	0.715E+00	8.95	34.63	9.78	0.83	.71418
E+02										
	19.11	0.00	9.78	138.9	0.720E+00	8.95	33.61	9.78	0.83	.81305
E+02										
	20.88	0.00	9.78	138.0	0.725E+00	8.95	32.65	9.78	0.83	.91192
E+02										

Cumulative travel time = 91.1923 sec (0.03 hrs)

END OF MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY

** End of NEAR-FIELD REGION (NFR) **

[illegible]

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Momentum fluxes:  m0      =0.6840E-02  M0      =0.3753E+00
LQ=B      =      0.021  lM      =      0.46  lm      =      0.11  lmp      = 99999.00
LQ      =      0.484  LM      =      1.52  Lm      =      2.43  Lmp      = 99999.00
Properties of riser group with 1 ports/nozzles each:
U0      =      0.571  D0      =      0.303  A0      =      0.072  THETA =      90.00
FR0      =      10.13  FRD0     =      2.67  R      =      2.27
(slot)      (riser group)

```


0.97	0.00	0.69	30.2	0.331E+01	0.21	27.45	.74592E+01
1.93	0.00	0.78	42.1	0.237E+01	0.40	27.46	.14918E+02
2.90	0.00	0.86	51.1	0.196E+01	0.60	27.48	.22377E+02
3.87	0.00	0.95	58.6	0.171E+01	0.79	27.50	.29837E+02
4.83	0.00	1.03	65.0	0.154E+01	0.98	27.51	.37296E+02
5.80	0.00	1.12	70.8	0.141E+01	1.18	27.53	.44755E+02
6.77	0.00	1.20	75.9	0.132E+01	1.37	27.54	.52214E+02
7.74	0.00	1.29	80.7	0.124E+01	1.56	27.56	.59673E+02
8.70	0.00	1.37	85.1	0.117E+01	1.75	27.57	.67132E+02
9.67	0.00	1.45	89.2	0.112E+01	1.95	27.59	.74592E+02
10.64	0.00	1.54	93.1	0.107E+01	2.14	27.61	.82051E+02
11.60	0.00	1.62	96.7	0.103E+01	2.33	27.62	.89510E+02

** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **

The pollutant concentration in the plume falls below water quality standard or CCC value of 0.100E+01 in the current prediction interval.

This is the spatial extent of concentrations exceeding the water quality standard or CCC value.

12.57	0.00	1.71	100.1	0.999E+00	2.53	27.64	.96969E+02
13.54	0.00	1.79	103.4	0.967E+00	2.72	27.65	.10443E+03
14.50	0.00	1.88	106.5	0.939E+00	2.91	27.67	.11189E+03
15.47	0.00	1.96	109.4	0.914E+00	3.11	27.69	.11935E+03
16.44	0.00	2.05	112.2	0.891E+00	3.30	27.70	.12681E+03
17.41	0.00	2.13	115.0	0.870E+00	3.49	27.72	.13426E+03
18.37	0.00	2.22	117.6	0.851E+00	3.68	27.73	.14172E+03
19.34	0.00	2.30	120.1	0.833E+00	3.88	27.75	.14918E+03
20.31	0.00	2.38	122.5	0.817E+00	4.07	27.76	.15664E+03
21.27	0.00	2.47	124.8	0.801E+00	4.26	27.78	.16410E+03
22.24	0.00	2.55	127.0	0.787E+00	4.46	27.80	.17156E+03
23.21	0.00	2.64	129.2	0.774E+00	4.65	27.81	.17902E+03
24.17	0.00	2.72	131.3	0.761E+00	4.84	27.83	.18648E+03
25.14	0.00	2.81	133.4	0.750E+00	5.04	27.84	.19394E+03
26.11	0.00	2.89	135.3	0.739E+00	5.23	27.86	.20140E+03
27.08	0.00	2.98	137.3	0.728E+00	5.42	27.88	.20886E+03
28.04	0.00	3.06	139.1	0.719E+00	5.62	27.89	.21632E+03
29.01	0.00	3.14	141.0	0.709E+00	5.81	27.91	.22377E+03
29.98	0.00	3.23	142.7	0.701E+00	6.00	27.92	.23123E+03
30.94	0.00	3.31	144.5	0.692E+00	6.19	27.94	.23869E+03
31.91	0.00	3.40	146.1	0.684E+00	6.39	27.95	.24615E+03
32.88	0.00	3.48	147.8	0.677E+00	6.58	27.97	.25361E+03
33.84	0.00	3.57	149.4	0.669E+00	6.77	27.99	.26107E+03
34.81	0.00	3.65	151.0	0.662E+00	6.97	28.00	.26853E+03
35.78	0.00	3.74	152.5	0.656E+00	7.16	28.02	.27599E+03
36.75	0.00	3.82	154.0	0.649E+00	7.35	28.03	.28345E+03
37.71	0.00	3.91	155.5	0.643E+00	7.55	28.05	.29091E+03
38.68	0.00	3.99	156.9	0.637E+00	7.74	28.07	.29837E+03
39.65	0.00	4.07	158.3	0.632E+00	7.93	28.08	.30583E+03
40.61	0.00	4.16	159.7	0.626E+00	8.13	28.10	.31328E+03
41.58	0.00	4.24	161.0	0.621E+00	8.32	28.11	.32074E+03
42.55	0.00	4.33	162.4	0.616E+00	8.51	28.13	.32820E+03
43.51	0.00	4.41	163.7	0.611E+00	8.70	28.15	.33566E+03
44.48	0.00	4.50	165.0	0.606E+00	8.90	28.16	.34312E+03
45.45	0.00	4.58	166.2	0.602E+00	9.09	28.18	.35058E+03
46.42	0.00	4.67	167.4	0.597E+00	9.28	28.19	.35804E+03
47.38	0.00	4.75	168.7	0.593E+00	9.48	28.21	.36550E+03
48.35	0.00	4.83	169.9	0.589E+00	9.67	28.22	.37296E+03

Cumulative travel time = 372.9581 sec (0.10 hrs)

Plume centerline may exhibit slight discontinuities in transition to subsequent far-field module.

END OF MOD277: UNSTABLE NEAR-FIELD ZONE OF ALTERNATING PERPENDICULAR DIFFUSER

** End of NEAR-FIELD REGION (NFR) **

Austin, Deanna (DEQ)

From: Grimmer, Lauren [LGrimmer@hrsd.com]
Sent: Monday, March 07, 2016 2:02 PM
To: Austin, Deanna (DEQ)
Subject: RE: York River Revoke and Reissue

Hi Deanna,

The CEL has confirmed the analytical results for Bacteria Samples from YR Stormwater 9/9/14. The reported results are correct.

The plant manager at YR, Andy Nelson, had the following explanation for the increase in microbial activity in the stormwater samples:

- Prior to September 2014 we had an abundance of geese that not only inhabited our plant site but also mated and bore offspring on an annual basis.
- The downside was mess they made on sidewalks and frequently traveled pathways for plant personnel.
- The storm water location we sampled also happens to be a preferred location for gosling swim lessons due to the ease of access and proximity of shallow and deep water pools.
- Based on our records, we received our first coyote decoy in September 2014 to try and discourage the geese population. Several of other HRSD facilities had employed decoys with a wide range of success.
- We now have six decoys located at several locations throughout the site and the results have been amazing.

Based on Andy's explanation, we sampled for stormwater during the peak of the plant geese population, explaining our very high bacterial values. Since that time, we have deployed decoys to significantly reduce the geese population on the plant site.

Lauren

From: Austin, Deanna (DEQ) [mailto:Deanna.Austin@deq.virginia.gov]
Sent: Monday, February 29, 2016 1:00 PM
To: Grimmer, Lauren
Subject: RE: York River Revoke and Reissue

Thanks about the chemicals. We'll put both on the list. No problem.

The bird issue: I'm a bit concerned about the serious increase from the last reissuance number and these numbers. I was concerned at last reissuance and therefore had the conversation about the geese. So, yes photos and a lengthier explanation would be a good start and then we'll go from there.

Deanna Austin
Technical Coordinator DEQ-TRO Water Permits
5636 Southern Blvd
Virginia Beach, VA 23462
Phone: 757-518-2008
Fax: 757-518-2009

From: Grimmer, Lauren [mailto:LGrimmer@hrsd.com]
Sent: Monday, February 29, 2016 12:48 PM
To: Austin, Deanna (DEQ)
Subject: RE: York River Revoke and Reissue

Hi Deanna,

The following chemicals should be added to the fact sheet:
methanol, ferric sulfate, hydrochloric acid and phosphoric acid

Ferric Chloride is a weird one. It's being used today, but we won't be receiving any more product. We're substituting Ferric Sulfate for the chloride. I asked if we would ever have ferric chloride again, and the plant manager said that we might. I'm not sure if that needs to be removed from your list, or if it should remain for now?

As for the Fecal and Entero, it seems like geese are still an issue. We can try to displace the geese and collect a resample, if you'd like, but that's going to take us a bit of time to complete. Is there anything I can send you to help with the geese explanation? Photos, or a lengthier description?

Lauren

From: Austin, Deanna (DEQ) [<mailto:Deanna.Austin@deq.virginia.gov>]
Sent: Friday, February 26, 2016 2:38 PM
To: Grimmer, Lauren
Subject: York River Revoke and Reissue

Hi Lauren-

I'm working hard to get this complete in the next week and have two things to cover.

Below is a list of materials stored onsite from the last fact sheet. Can you verify these for me and let me know if anything needs to be added/removed.

The materials stored on site include sodium hypochlorite, sodium bisulfate, sodium hydroxide, ferric chloride, polymer, fuel oil, propane, ammonia, gasoline and diesel fuel. The materials are either stored in buildings with drains connected to the treatment system or are in contained areas. Fuel tanks are double walled.

Also, Fecal and Entero are high in the SW sample in the application. We have addressed this issue before as being related to some bird issues out there, however, the last application had values of 3100 col/100ml for FC and 500 col/100 ml for Entero. This application has 86400 col/100ml and Entero has 30000 col/100 ml. Can you please provide some additional info on the extremely high values since there is a bacteria TMDL for the York River.

Thanks,

Deanna Austin
Technical Coordinator DEQ-TRO Water Permits
5636 Southern Blvd
Virginia Beach, VA 23462
Phone: 757-518-2008
Fax: 757-518-2009

ATTACHMENT 7

SPECIAL CONDITIONS RATIONALE

VPDES PERMIT PROGRAM
LIST OF SPECIAL CONDITIONS RATIONALE

Name of Condition:

B. Additional Total Residual Chlorine (TRC) Limitations and Monitoring Requirements

Rationale: Required by Water Quality Standards, 9VAC 25-260-170, Fecal coliform bacteria; other waters. Also, 40 CFR 122.41(e) requires the permittee, at all times, to properly operate and maintain all facilities and systems of treatment in order to comply with the permit. This ensures proper operation of chlorination equipment to maintain adequate disinfection.

C. OTHER REQUIREMENTS OR SPECIAL CONDITIONS

1.a. Sludge Reopener

Rationale: Required by the VPDES Permit Regulation, 9 VAC 25-31-220 C., and 40 CFR 122.44 (c)(4), which note that all permits for domestic sewage treatment plants (including sludge-only facilities) include any applicable standard for sewage sludge use or disposal promulgated under section 405(d) of the Clean Water Act.

1.b. Water Quality Standards Reopener

Rationale: The VPDES Permit Regulation, 9 VAC 25-31-220 D requires effluent limitations to be established which will contribute to the attainment or maintenance of water quality criteria.

1.c. Nutrient Reopener

Rationale: 9 VAC 25-40-70 A authorizes DEQ to include technology-based annual concentration limits in the permits of facilities that have installed nutrient control equipment, whether by new construction, expansion or upgrade. 9 VAC 25-31-390 A authorizes DEQ to modify VPDES permits to promulgate amended water quality standards.

1.d. Nutrient Removal Facilities Reopener

Rationale: 9 VAC 25-40-70 A authorizes DEQ to include technology-based annual concentration limits in the permits of facilities that have installed nutrient control equipment, whether by new construction, expansion or upgrade.

1.e. Total Maximum Daily Load (TMDL) Reopener

Rationale: For specified waters, section 303(d) of the Clean Water Act requires the development of total maximum daily loads necessary to achieve the applicable water quality standards. The TMDL must take into account seasonal variations and a margin of safety. In addition, section 62.1-44.19:7 of the State Water Control Law requires the development and implementation of plans to address impaired waters, including TMDLs. This condition allows for the permit to be either modified or, alternatively, revoked and reissued to incorporate the requirements of a TMDL once it is developed. In addition, the reopener recognizes that, in according to section 402(o)(1) of the Clean Water Act, limits and/or conditions may be either more or less stringent than those contained in this permit. Specifically, they can be relaxed if they are the result of a TMDL, basin plan or other wasteload allocation prepared under section 303 of the Act.

2. Licensed Operator Requirement

Rationale: The Permit Regulation, 9 VAC 25-31-200 D and Code of Virginia 54.1-2300 et. seq., Rules and Regulations for Waterworks and Wastewater Works Operators (18 VAC 160-20-10 et seq.) requires licensure of operators.

3. Reliability Class

Rationale: Required by Sewage Collection and Treatment Regulations, 12 VAC 5-581-20 and 120 for all municipal facilities.

4. CTC, CTO and O & M Manual Requirements

Rationale: Required by the State Water Control Law, Section 62.1-44.19; the Sewage Collection and Treatment Regulations (12 VAC 5-581 et seq); Section 401 of the Clean Water Act; 40 CFR 122.41(e); and the VPDES Permit Regulation (9 VAC-25-31-190E).

9 VAC 25-40-70 A authorizes DEQ to include technology-based annual concentration limits in the permits of facilities that have installed nutrient control equipment, whether by new construction, expansion or upgrade.

5. 95% Design Capacity Notification

Rationale: Required by the VPDES Permit Regulation, 9 VAC 25-31-200 B.2. for all POTW and PVOTW permits. Best professional judgment is used to apply this condition to other (private) municipal treatment facilities.

6. Quantification Levels Under Part I.A.

Rationale: States are authorized to establish monitoring methods and procedures to compile and analyze data on water quality, as per 40 CFR part 130, Water Quality Planning and Management, subpart 130.4.

7. Compliance Reporting Under Part I.A.

Rationale: Defines reporting requirements for toxic parameters with quantification levels and other limited parameters to ensure consistent, accurate reporting on submitted reports.

8. Effluent Monitoring Frequencies

Rationale: The incentive for reduced monitoring is an effort to reduce the cost of environmental compliance and to provide incentives to facilities which demonstrate outstanding performance and consistent compliance with their permits. Facilities which cannot comply with specific effluent parameters or have other related violations will not be eligible for this benefit. This is in conformance with Guidance Memorandum No. 98-2005 - Reduced Monitoring and EPA's proposed "Interim Guidance For Performance-Based Reduction of NPDES Permit Monitoring Frequencies" (EPA 833-B-96-001) published in April 1996.

9. Indirect Dischargers

Rationale: Required by VPDES Permit Regulation, 9 VAC 25-31-200 B.1. for POTWs and PVOTWs that receive waste from someone other than the owner of the treatment works.

10. Total Phosphorus/Total Nitrogen-Nutrient reporting calculations

Rationale: §62.1-44.19:13 of the Code of Virginia defines how annual nutrient loads are to be calculated; this is carried forward in 9 VAC 25-820-70. As annual concentrations (as opposed to loads) are limited in the individual permit, this special condition is intended to reconcile the reporting calculations between the permit programs, as the permittee is collecting a single set of samples for the purpose of ascertaining compliance with two permits.

11. Suspension of concentration limits for E3/E4 facilities

Rationale: 9 VAC 25-40-70 B authorizes DEQ to approve an alternate compliance method to the technology-based effluent concentration limitations as required by subsection A of this section. Such alternate compliance method shall be incorporated into the permit of an Exemplary Environmental Enterprise (E3) facility or an Extraordinary Environmental Enterprise (E4) facility to allow the suspension of applicable technology-based effluent concentration limitations during the period the E3 or E4 facility has a fully implemented environmental management system that includes operation of installed nutrient removal technologies at the treatment efficiency levels for which they were designed.

12. Sludge Management Plan

Rationale: The VPDES Permit Regulation, 9 VAC 25-31-420, and 40 CFR 503.1 specify the purpose and applicability for sludge management plans. The VPDES Permit Regulation, 9 VAC 25-31-100 J.4., also sets forth certain detailed information which must be included in a sludge management plan. The VPDES sewage sludge permit application form and its attachments constitute the sludge management plan and will be considered for approval with the VPDES permit. In addition, the Biosolids Use Regulation, 12 VAC 5-585-330 and 340, specifies the general purpose and control requirements for an O&M manual in order to facilitate proper O&M of the facilities to meet the requirements of the regulation.

D. WHOLE EFFLUENT TOXICITY MONITORING

Rationale: To determine the need for pollutant specific and/or whole effluent toxicity limits as may be required by the VPDES Permit Regulation, 9 VAC 25-31-220 D. and 40 CFR 122.44 (d). See Attachment 8 of this fact sheet for additional justification.

E. PRETREATMENT

Rationale: The permit regulation, 9 VAC 25-31-10 et seq., Part VII, establishes the legal requirements for State, local government and industry to implement National Pretreatment Standards. The Pretreatment Standards are implemented to prevent POTW plant pass through, interference, violation of water quality standards or contamination of sewage sludge. The regulation requires POTWs with a total design flow greater than 5 MGD with significant or categorical industrial input to establish a Pretreatment Program. The regulation also may apply to POTWs with design flows less than 5 MGD if circumstances warrant control of industrial discharges.

ATTACHMENT 8

TOXICS MONITORING/TOXICS REDUCTION/
WET LIMIT RATIONALE

MEMORANDUM

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

TIDEWATER REGIONAL OFFICE

5636 Southern Boulevard

Virginia Beach, VA 23462

SUBJECT: Toxics Management Program (TMP) testing for HRSD-York River STP (VA0081311)

TO: File

FROM: Deanna Austin

DATE: 1/27/16

COPIES:

HRSD-York River plant is a major municipal discharger (design flow 15 MGD) of treated domestic sewage. Discharge from outfall 001 to the York River will begin monitoring with this revoked and reissued permit. The discharge had been monitored for toxicity through the permit held by the Dominion Power Yorktown Facility. The monitoring for toxicity will begin by HRSD once the CTO is issued for the new discharge pipe.

A mixing analysis was submitted by HRSD to DEQ in late 2015. DEQ concurrence with the CORMIX modeling was received from DEQ Central Office on 12/8/15. The dilution to use for permit is 29.8:1 for acute dilution and 114.6:1 for chronic dilution

Acute dilution = $100/IWC_a$

$29.8 = 100/IWC_a$

$100/65 = 3.36\% IWC_a$

$LC_{50} = IWC/$ Acute Water Quality Instream criterion

$LC_{50} = 3.36/0.3 = 11.2\%$

A LC_{50} of 11.2% will be used in the permit.

$TU_a = 1/LC_{50} \times 100$

$1/11.2 \times 100 = 8.93$

$TU_a = 8.9$

Chronic toxicity monitoring is not required based upon the chronic IWC being <1%. (guidance document 00-2012).

Chronic dilution = $100/IWC_c$

$114.6 = 100/IWC_c$

$100/114.6 = 0.87\% IWC_c$

The following TMP language is recommended for the reissuance of the HRSD York River STP permit (VA0081311).

D. Whole Effluent Toxicity Monitoring

1. Biological Monitoring

- a. In accordance with the schedule in 2. below, the permittee shall conduct annual acute toxicity tests from the date of the CTO issuance until the expiration of the permit. The permittee shall collect 24-hour flow-proportioned composite samples of final effluent from outfall 001 in accordance with Part 1.A. of this permit. The acute tests to use are:

48 Hour Static Acute test using Americamysis bahia and
48 Hour Static Acute test using Cyprinodon variegatus

These acute tests shall be performed with a minimum of 5 dilutions, derived geometrically, for the calculation of a valid LC_{50} . Express the results as TU_a (Acute Toxic Units) by dividing $100 / LC_{50}$ for reporting. Both species should be analyzed at the same time from the 24-hour flow-proportioned composite sample. Toxicity samples shall be taken at the same time as the other chemical parameter monitoring listed in Part I.A. of this permit for outfall 001.

Test procedures and reporting shall be in accordance with the WET testing methods cited in 40 CFR 136.3.

- b. The permittee may provide additional samples to address data variability during the period of initial data generation. These data shall be reported and may be included in the evaluation of the effluent toxicity. Test procedures and reporting shall be in accordance with the WET testing methods cited in 40 CFR 136.3.
- c. The test dilutions shall be able to determine compliance with the following endpoints:
- (1) Acute LC_{50} of 11.2% equivalent to a TU_a of 8.9
- d. All applicable data will be evaluated for reasonable potential at the conclusion of the test period. The data may be evaluated sooner if requested by the permittee, or if toxicity has been noted. Should evaluation of the data indicate that a limit is needed, a WET limit and compliance schedule will be required and the toxicity tests of D.1.a. may be discontinued.

2. Reporting Schedule

The permittee shall report the results and supply **one** complete copy of the toxicity test reports to the Tidewater Regional Office in accordance with the schedule below. A complete report must contain a copy of all laboratory

benchsheets, certificates of analysis, and all chains of custody.

(a)	Conduct first annual TMP test for outfall 001 using <u>Americamysis bahia</u> and <u>Cyprinodon variegatus</u>	By December 31, of the year the CTO is issued
(b)	Submit results of all biological tests	Within 60 days of the sample date and no later than January 10 th of the year following CTO issuance
(c)	Conduct subsequent annual TMP tests for outfall 001 using <u>Americamysis bahia</u> and <u>Cyprinodon variegatus</u>	By December 31 of each year
(d)	Submit subsequent annual biological tests	Within 60 days of the sample date and no later than January 10 th of the year following sampling.

ATTACHMENT 9

RECEIVING WATERS INFO./
TIER DETERMINATION/STORET DATA/
STREAM MODELING

303(d) LISTED SEGMENTS

TMDL Permit Review

Date: 9/21/2015

To: Jennifer Howell, TRO

JSH 10/20/2015

Permit Writer: Deanna Austin

Facility: HRSD York River STP

Permit Number: VA0081311

Issuance, Reissuance or Modification (if Modification describe) : Revoke and Reissuance

Permit Expiration Date: 1/27/2018

Waterbody ID (ex: VAT-G15E): VAT-F27E

Topo Name: Poquoson West

Facility Address:

515 Back Bay Creek Road Seaford, VA 23696

Receiving Stream: Attached are topographic maps showing facility property boundaries and outfall(s) locations for those included in this request.

Stream Name: York River	
Click here to enter text.	
Outfall #: 001	Lat Lon: 37 13 34 -76 27 33
Stream Name (2): Back Creek Various SW Outfalls ALL SW outfalls are not monitored- NO Exposure Certification given to facility	
Outfall #: 002	Lat Lon: 37 12 12 76 26 46
Outfall #: 003	Lat Lon: 37 12 18 76 26 48
Outfall #: 005	Lat Lon: 37 12 7 76 26 52
Outfall #: 006	Lat Lon: 37 12 7 76 27 8
Outfall #: 007	Lat Lon: 37 12 18 76 26 59

If greater than 2 receiving streams or 3 outfalls per stream please provide a separate table with outfall listings and Latitude Longitude description.

Is there a design flow change? If yes give the change. NO CHANGE

TMDL Review:

Is a TMDL IN PROGRESS for the receiving stream? No	
Has a TMDL been APPROVED that includes the receiving stream?	
Yes, see below	
If yes, Include TMDL Name, Pollutant(s) and date of approval:	
1. Outfalls 001-003, 005-007: Chesapeake Bay TMDL EPA Approval 12/29/2010: nitrogen, phosphorous, TSS 2. Outfalls 002-003, 005-007: Total Maximum Daily Loads of Bacteria for Poquoson River and Back Creek in the City of Poquoson and in York County, Virginia: EPA Approval 3/19/2014, SWCB Approval 6/30/2014: Fecal coliform	
Is the facility assigned a WLA from the TMDL?	Yes, see below
If Yes, what is the WLA? Only use EOS Loads for Chesapeake Bay TMDL WLAs	
1) VA0081311 was listed in the Chesapeake Bay TMDL under Bay segment MOBPH as a significant discharger. This permit did receive an individual annual WLA which is presented as an Edge of Stream (EOS) (TMDL Report Appendix Q). The EOS loads for TN and TP are also referenced in the York Basin WQMP 9VAC25-720-120 Table C TN (lbs/yr): EOS 274,100 TP (lbs/yr): EOS 18,273 TSS (lbs/yr): EOS 1,370,502 2) Outfalls 002-003, 005-007 are located within the TMDL watershed boundary for the BacteriaTMDL report listed above. However, no WLA was assigned to this permit because it is not considered a contributor of the TMDL pollutant.	

Review will be completed in 30 days of receipt of request.

TMDL Permit Review

Additional Comments:

Delivered loads are the amount of a pollutant delivered to the tidal waters of the Chesapeake Bay or its tributaries from an upstream point. Delivered loads differ from edge-of-stream loads because of in-stream processes in free-flowing rivers that naturally remove nitrogen and phosphorus from the system.

Planning Permit Review

Date: 9/21/2015

To: Kristie Britt, TRO

Permit Writer: Deanna Austin

Facility: HRSD York River STP

Permit Number: VA0081311

Issuance, Reissuance or Modification (if Modification describe): Revoke and Reissuance

Permit Expiration Date: 1/27/2018

Waterbody ID (ex: VAT-G15E): VAT F27 E

Topo Name: Poquoson West

Facility Address:

515 Back Bay Creek Road Seaford, VA 23696

Receiving Stream: Attached are topographic maps showing facility property boundaries and outfall(s) locations for those included in this request.

Stream Name: York River	
Stream Data Requested? No	
Outfall #: 001	Lat Lon: 37 13 34 -76 27 33
Outfall #:	Lat Lon:
Outfall #:	Lat Lon:
Stream Name (2): Back Creek Various SW Outfalls	
ALL SW outfalls are not monitored- NO Exposure Certification given to facility	
Stream Data Requested?	
Outfall #:	Lat Lon:
Outfall #:	Lat Lon:
Outfall #:	Lat Lon:

If greater than 2 receiving streams or 3 outfalls per stream please provide a separate table with outfall listings and Latitude Longitude description.

Planning Review:

303 (d): Indicate Outfalls which discharge directly to an impaired (Category 5) stream segment and parameters impaired	
Outfall 001 discharges to impaired stream segment VAT-F27E YRK02B00. See Attachment 1.	
Tier Determination	
Tier	The Tier 1 is maintained for Outfall 001. See Attachment 1.
Tier	
Management Plan	
Is the facility Referenced in a Management Plan?	No
Are limits contained in a Management Plan?	No

Review will be completed in 30 days of receipt of request.

Additional Comments:

KNB 10/2/2015



2012 Impaired Waters - 303(d) List

Category 5 - Waters needing Total Maximum Daily Load Study

York River Basin

Cause Group Code Impaired Use	Water Name Cause	Cause Category	Estuary (Sq. Miles)	Reservoir (Acres)	River (Miles)	Initial List Date	TMDL Dev. Date
F22R-05-PH Aquatic Life	Doctors Creek pH	5C			2.21	2008	2020
F23E-03-BAC Recreation	Mattaponi River Escherichia coli	5A	0.159			2012	2024
F23R-01-BAC Recreation	Garnetts Creek Escherichia coli	5A			2.83	2010	2022
F23R-02-DO Aquatic Life	Dickeys Swamp, Garnetts Creek, and Tributaries Oxygen, Dissolved	5C			11.30	2002	2014
	Oxygen, Dissolved	5C			9.74	2010	2014
F23R-03-DO Aquatic Life	Walkerton Branch Oxygen, Dissolved	5C			4.63	2006	2018
F23R-03-PH Aquatic Life	Walkerton Branch pH	5C			4.63	2004	2016
F23R-04-BAC Recreation	Aylett Creek Escherichia coli	5A			6.60	2012	2024
F23R-04-PH Aquatic Life	Aylett Creek pH	5A			6.60	2012	2024
F23R-06-PCB Fish Consumption	Mattaponi River PCB in Fish Tissue	5A	0.159		4.71	2006	2018
	PCB in Fish Tissue	5A	6.779			2010	2018
	PCB in Fish Tissue	5A			10.90	2010	2022
F23R-07-PH Aquatic Life	Walkerton Branch pH	5C			0.17	2012	2024
F24R-02-PH Aquatic Life	Mill Creek pH	5C			0.40	2012	2024
F25R-02-DO Aquatic Life	Tastine Swamp Oxygen, Dissolved	5C			2.15	2010	2022
F26E-01-PCB Fish Consumption	York River and Tributaries PCB in Fish Tissue	5A	0.506			2002	2014
	PCB in Fish Tissue	5A	57.302			2006	2018
F26E-02-SF Shellfishing	Aberdeen Creek Fecal Coliform	5B	0.022			2002	2014
F26E-06-SF Shellfishing	Fox Creek Fecal Coliform	5B	0.022			2006	2018
F26E-10-SF Shellfishing	Carter Creek / York River Fecal Coliform	5B	0.030			2004	2016
	Fecal Coliform	5B	0.024			2012	2016

Appendix 5 - List of Impaired (Category 5) Waters in 2012

York River Basin

Cause Group Code: F26E-01-PCB

York River and Tributaries

Location: The York River from West Point downstream to the mouth near Tue Point and the tidal portion of the following tributaries:
King Creek, Queen Creek, and Wormley Creek

City / County: Gloucester Co James City Co King And Queen Co King William Co New Kent Co
 Williamsburg City York Co

Use(s): Fish Consumption

Cause(s) /

VA Category: PCB in Fish Tissue / 5A

The segments are included under a 12/13/2004 VDH Fish Consumption Advisory due to polychlorinated biphenyls (PCBs) in fish tissue. The advisory recommends that adults eat no more than two meals/month of croaker, gizzard shad, and spot. High risk individuals such as women who are pregnant or may become pregnant, nursing mothers, and young children are advised not to eat any fish contaminated with PCBs.

The advisory is based on the results of DEQ's fish tissue monitoring program, which indicated fish tissue value exceedances at the following stations:

8-YRK031.48
8-YRK016.57
8-YRK022.70
8-YRK005.93
8-QEN002.47
8-QEN005.62
8-KNG001.36
8-KNG000.18
8-WOR000.35

The TMDL is due in 2018.

York River and Tributaries	Estuary (Sq. Miles)	Reservoir (Acres)	River (Miles)
Fish Consumption			
PCB in Fish Tissue - Total Impaired Size by Water Type:			
			57.809

Sources:

Source Unknown



2012 Impaired Waters (Category 4A) TMDL Approved and (Category 4B) Other Control Measures Present*

York River Basin

Cause Group Code Impaired Use	Water Name Cause	Cause Category	Estuary (Sq. Miles)	Reservoir (Acres)	River (Miles)	Initial List Date	TMDL Dev. Date
YRKMH-DO-BAY	York Mesohaline						
Aquatic Life	Oxygen, Dissolved	4A	0.827			1998	2010
	Oxygen, Dissolved	4A	36.268			2006	2010
Open-Water Aquatic Life	Oxygen, Dissolved	4A	0.827			1998	2010
	Oxygen, Dissolved	4A	36.268			2006	2010
YRKMH-SAV-BAY	York Mesohaline						
Aquatic Life	Aquatic Plants (Macrophytes)	4A	37.096			2006	2010
Shallow-Water Submerged Aquatic Vegetation	Aquatic Plants (Macrophytes)	4A	37.096			2006	2010
YRKPH-DO-BAY	York Polyhaline Estuary						
Aquatic Life	Oxygen, Dissolved	4A	11.706			2004	2010
	Oxygen, Dissolved	4A	13.933			2006	2010
	Oxygen, Dissolved	4A	0.629			2008	2010
	Oxygen, Dissolved	4A	0.392			2010	2010
Deep-Water Aquatic Life	Oxygen, Dissolved	4A	11.706			2004	2010
	Oxygen, Dissolved	4A	11.971			2006	2010
	Oxygen, Dissolved	4A	0.024			2008	2010
Open-Water Aquatic Life	Oxygen, Dissolved	4A	11.706			2004	2010
	Oxygen, Dissolved	4A	13.933			2006	2010
	Oxygen, Dissolved	4A	0.629			2008	2010
	Oxygen, Dissolved	4A	0.392			2010	2010
YRKPH-SAV-BAY	York Polyhaline Estuary						
Aquatic Life	Aquatic Plants (Macrophytes)	4A	26.659			2006	2010
Shallow-Water Submerged Aquatic Vegetation	Aquatic Plants (Macrophytes)	4A	26.659			2006	2010

VA DEQ is transitioning from Fecal Coliform bacteria to Escherichia coli (fresh water) and Enterococci (salt water) for assessing the Recreation Use.

* Multiple listings are due to the same impairments for different uses and/or different initial listing dates for adjacent waters.

VIRGINIA

Draft 305(b)/303(d)

WATER QUALITY INTEGRATED REPORT

to

CONGRESS and the EPA ADMINISTRATOR

for the

PERIOD

January 1, 2005 to December 31, 2010



Richmond, Virginia

March 2012

ATTACHMENT 10

TABLE III (a) AND TABLE III (b) -
CHANGE SHEETS

TABLE III (a)

VPDES PERMIT PROGRAM
Permit Processing Change Sheet

1. Effluent Limits and Monitoring Schedule: (List any changes FROM PREVIOUS PERMIT and give a brief rationale for the changes).

OUTFALL NUMBER	PARAMETER CHANGED	MONITORING LIMITS CHANGED FROM / TO	EFFLUENT LIMITS CHANGED FROM / TO	RATIONALE	DATE & INITIAL
OTHER CHANGES:		COMMENTS:		DATE & INITIAL	
Added Whole Effluent Toxicity Monitoring		The facility will be discharging at their own location once the pipe in the York River is complete instead of discharging through the Dominion canal.		3/8/16 DDA	
Updated the O&M Manual Condition and the Pretreatment Condition		In accordance with the DEQ VPDES permit manual.		3/9/16 DDA	

VPDES PERMIT PROGRAM
Permit Processing Change Sheet

11. Effluent Limits and Monitoring Schedule: (List any changes MADE DURING PERMIT PROCESS and give a brief rationale for the changes).

[illegible]

ATTACHMENT 11

CHRONOLOGY SHEET